Imagine COMMUNICATIONS™

Installation and Operation Manual

Selenio 6800™

XHD6801+

Broadcast Quality Up/Cross/Downconverter

Edition E

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Delivering the Moment

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Publication Information

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XHD6801+

Broadcast-Quality Up/Cross/Downconverter

Installation and Operation Manual

Edition E
November 2012

Contents

Preface

Manual Information vii
Unpacking/Shipping Information ix
Restriction on Hazardous Substances (RoHS) Compliance x
Waste from Electrical and Electronic Equipment (WEEE) Compliance xi
Safety xii

Chapter 1: Introduction

Overview 1
Product Description 2
Main Features 2
Software Key Options 4
Applications 5
Module Description 6
Front Module 6
Back Module 8
Signal Flow 10

Chapter 2: Installation

Overview 11
Maximum 6800+ Frame Power Ratings 12
Unpacking the Module 13
Preparing the Product for Installation 13
Checking the Packing List 13
Setting Jumpers 14
Installing XHD6801+ Modules 17
XHD6801+ License Keys 17

Upgrading Module Firmware 18
Upgrading the Firmware 18
Correcting a Failed Upgrading Procedure 21

Chapter 3: Configuration and Operation

Overview 25
Operating Notes 26
Video Processing Modes 27
Mode 1: Scaled Outputs with Re-clocked Inputs 27
Mode 2: Frame Sync and Scalar Outputs 28
Mode 3: Discrete Frame Sync and Scalar Outputs 30
Q-SEE Compliant Thumbnails 30
Changing Parameter Settings 32
Changing Parameters Using CCS Software 32
Changing Parameter Settings Using Card-Edge Controls 33
Enabling On-Screen Display 35
Recalling Default Parameter Settings 35
Reading Software and Hardware Versions 35
Entering License Keys 36
Aspect Ratio Processing 37
Enhanced Aspect Ratio Conversion Control 37
Enhanced AFD/WSS/VI Insertion 37
Selecting a Standard Aspect Ratio 38
Selecting a Custom Aspect Ratio 39
Selecting Aspect Ratio Control Following AFD, VI, WSS 39
Setting a Custom Aspect Ratio 40
Active Format Description 40
AFD/ARC Alignment 40
AFD, VI, and WSS Detection 42
AFD, VI and WSS Code Insertion 43
AFD, VI, WSS Based Aspect Ratio Control 44
AFD, VI, WSS Custom Mapping Configuration 44
Advanced Controls 44
AFD Descriptions 45
Closed Captioning and DVB Teletext Captioning 52
Setting Closed Captioning and Teletext 52
Audio Configuration 53
Audio Controls 53

Audio Routing 53
Audio Proc Amp 54
Audio Status Parameters 55
GPI 56
GPI Input 56
GPI Output 56
Video Keying 56

Chapter 4: Parameters, LEDs, and Alarms

Overview 57
Control Parameters 58
On Screen Display Monitoring 58
LEDs and Alarms 59
LEDs 59
Alarms 61

Chapter 5: Specifications

Overview 63
Inputs 64
SD/HD-SDI Video 64
Genlock 65
Outputs 66
SDI Video Outputs 66
Miscellaneous 67
Audio Delay (Data Out) 67
Performance 67
Propagation Delays 67

Appendix A: Communication and Control Troubleshooting Tips

Overview 69
Software Communication Problems 70
Hardware Communication Problems 73

Index

Keywords 75

Preface

Manual Information

Purpose

This manual details the features, installation, operation, maintenance, and specifications for the XHD6801+ broadcast-quality up/cross/down-converter.

Audience

This manual is written for engineers, technicians, and operators responsible for installation, setup, maintenance, and/or operation of the XHD6801+ broadcast-quality up/cross/downconverter.

Revision History

Table P-1. Revision History of Manual

Edition	Date	Comments
A	June 2008	Initial release
B	August 2009	Addition of propagation delay specs, miscellaneous corrections
C	March 2010	Addition of ARC and GPI improvements
D	September 2011	Addition of a third video processing mode
E	November 2012	Changes to product feature list

Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

Table P-2. Writing Conventions

Term or Convention	Description
Bold	Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names
Italics	Indicates E-mail addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE
Code	Indicates variables or command-line entries, such as a DOS entry or something you type into a field
>	Indicates the direction of navigation through a hierarchy of menus and windows
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a website or URL
Note	Indicates important information that helps to avoid and troubleshoot problems

Obtaining Documents

Product support documents can be viewed or downloaded from our Web site. Alternatively, contact your Customer Service representative to request a document.

Unpacking/Shipping Information

Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

Product Servicing

Except for firmware upgrades, XHD6801+ modules are not designed for field servicing. All hardware upgrades, modifications, or repairs require you to return the modules to the Customer Service center.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

Ship products back to us for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, we will return the product prepaid after servicing.

Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and “lead-free.” (See our website for more information.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive is marked with a RoHS-compliant emblem, as shown in Figure P-1.

Figure P-1. RoHS Compliance Emblem

Waste from Electrical and Electronic Equipment (WEEE) Compliance

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. As of August 13, 2005, producers or users are required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU are affixing labels that indicate such products must be properly recycled. (See our website for more information.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive is marked with a WEEE-compliant emblem, as shown in Figure P-2.

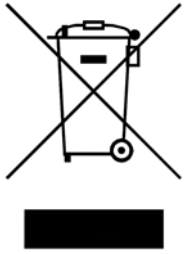


Figure P-2. WEEE Compliance Emblem

Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. If this product is rack-mountable, it should be mounted in an appropriate rack using the rack-mounting positions and rear support guides provided. It is recommended that each frame be connected to a separate electrical circuit for protection against circuit overloading. If this product relies on forced air cooling, it is recommended that all obstructions to the air flow be removed prior to mounting the frame in the rack.

If this product has a provision for external earth grounding, it is recommended that the frame be grounded to earth via the protective earth ground on the rear panel.

IMPORTANT! Only qualified personnel should perform service procedures.

Safety Terms and Symbols in this Manual

WARNING

Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.

CAUTION

Statements identifying conditions or practices that can result in damage to the equipment or other property.

Chapter 1

Introduction

Overview

XHD6801+ modules offer broadcast-quality HD/SD-SDI upconversion, crossconversion, and downconversion with aspect ratio conversion (ARC), and closed-captioning support. There are three basic varieties available:

- XHD6801+UCT up/crossconverter
- XHD6801+DT downconverter
- XHD6801+UCDT up/cross/down converter

XHD6801+UC and XHD6801+D and can be upgraded in the field to full up/cross/down converter functionality.

This chapter includes the following topics:

- "Product Description" on page 2
- "Module Description" on page 6

Note

XHD6801+ modules must be installed in frames with fans. FR6802+DM and 6800/7000 series frames also do not support these products.

Product Description

XHD6801+ modules provide conversion between SD-SDI and HD-SDI video. They include aspect ratio conversion (ARC) capabilities, and can accept both embedded audio and ANC data.

The SDI input has error monitoring capabilities in the SD mode (EDH) and in HD mode (CRC), and supports external or midplane genlock sources.

You can control XHD6801+ modules using card-edge controls and CCS-enabled hardware and software control products.

Additionally, you can use SNMP control systems and HTTP (Internet) browsers if you purchase the required licenses. Contact your Customer Service representative for more details.

Main Features

XHD6801+ features include the following:

- Upconversion of SD-SDI video to broadcast-quality HD-SDI video (XHD6801+UCT and XHD6801+UCDT)
- Crossconversion of HD-SDI video (XHD6801+UCT and XHD6801+UCDT)
- Downconversion of HD-SDI video to SD-SDI video (XHD6801+DT and XHD6801+UCDT)
- Inputs
    - Auto-sensing HD/SD-SDI input with embedded audio data, error monitoring, VANC data such as WSS/VI/AFD and optional closed captioning and teletext
    - Analog composite genlock input with support for tri- and bi-level sync

- Outputs
  - Four equalized and reclocked HD/SD-SDI outputs of the SDI input that can be configured to be frame synchronized
  - Two HD/SD-SDI outputs carrying the converted program signal with:
    - Embedded audio
    - Video Ancillary Data Space (VANC) data, including Wide Screen Signalling (WSS), Video Index (VI), and Active Format Description (AFD)
    - EIA608, EIA708 closed captioning transfer and transcoding between formats
    - Teletext capabilities
  - Two configurable HD/SD-SDI outputs carrying either the converted program signal or the key or monitor signal (with OSD for displaying control parameter settings)
  - User-selectable input/output standards and formats
- Video Processing
  - 10-bit up-, down-, cross-, and aspect ratio conversion with motion adaptive de-interlacing
  - Color-space conversion between SD-SDI (601) and HD-SDI (709)
  - User-configurable aspect ratio conversion (H/V size and position) for picture resizing, with eight selectable internally-generated color ARC backgrounds
  - Variable aspect ratio conversion with five user presets and fixed preset aspect ratios that include 16:9 anamorphic, 16:9 middle cut, 14:9, 4:3, and pixel true
  - Aspect ratio adjustment according to embedded WSS/VI/AFD information
  - User-selectable video frame delay of up to 12 frames
  - Clean cut transition during aspect ratio change

- ANC Processing
  - Enhanced WSS, VI, and AFD decoding, processing, and encoding capabilities
  - Automatic correction of AFD codes if incoming AFD information is incorrect
  - Fully-configurable AFD/VI/WW embedding on AFD loss
- 24-bit audio processing
  - Embedded audio processing (demultiplexing from SDI, delay/sync, sample rate conversion, and remultiplexing into SDI)
  - Support for 4 groups (16 channels) of embedded audio
  - Support for compressed and linear PCM audio data in the same audio group
  - Mono level swapping of audio channels
  - Handling of any embedded compressed audio with fixed delay
  - Audio delay that matches video propagation plus additional user delay of up to 1.2 seconds
- Store and recall of ARC presets through SNMP and CCS-enabled hardware and software controls
- Loss of video (LOV) modes, including pass, freeze, and black
- Built-in HD/SD-SDI test generator containing white, black, frequency sweep, cross-hatch pattern, color bars signal, and Safe Area Graticles (SAG) key
- Support for Q-SEE compliant thumbnails when installed in a FR6802+QXF frame
- Soft edge rectangle key output of non-picture area

Software Key Options

The following software option keys are available:

- XHD68+D-UG-UCD software key converts a XHD6801+DT to a full XHD6801+UCDT up/cross/down converter.
- XHD68+UC-UG-UCD software key converts a XHD6801+UCT to a full XHD6801+UCDT up/cross/down converter.

Applications

The XHD6801+ modules are suitable for the following applications:

- Final conversion to a high- or standard-definition output, regardless of input format
- Bridging between high-definition and standard-definition installations in a mixed signal facility
- Bridging between 720p and 1080p high-definition installations
- Transitioning small market broadcasters requiring high-quality conversion
- Ingestion of high-definition or standard-definition signal into a facility running either video standard

Module Description

Front Module

Figure 1-1 shows the position of the LEDs and module controls on the front of the XHD6801+ modules.

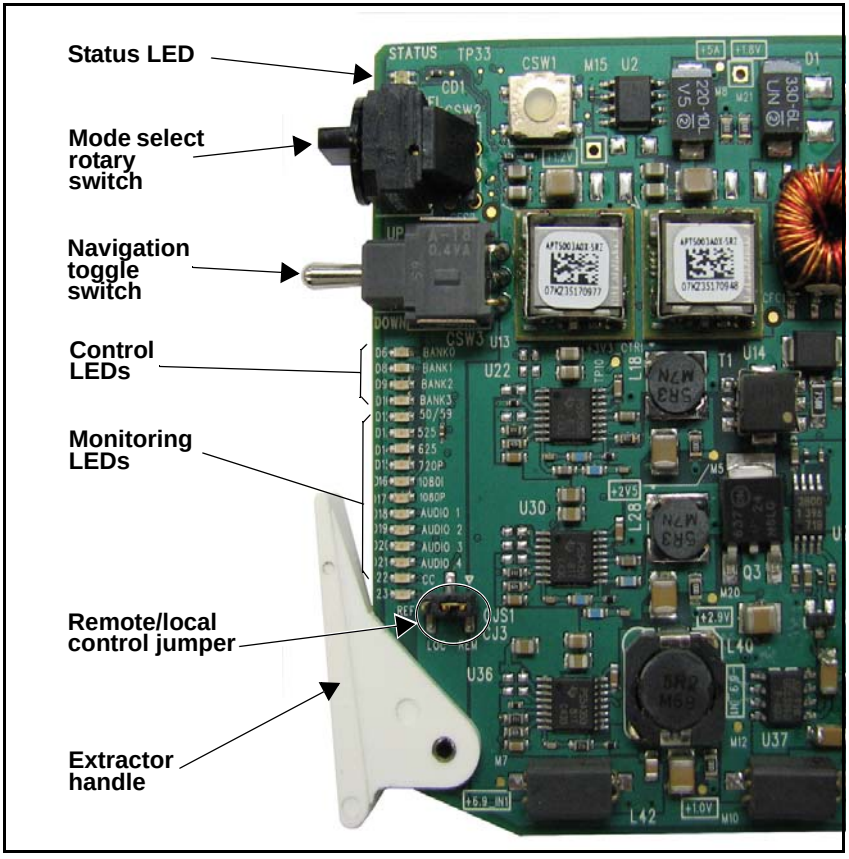


Figure 1-1. XHD6801+ Module

Table 1-1 on page 7 briefly describes generic 6800+ LEDs, switches, and jumpers.

Table 1-1. Generic 6800+ Module Features

Feature	Description
Status LED	Various color and lighting combinations of these LEDs indicate the module's state and activities. See "LEDs and Alarms" on page 59 for more information.
Mode select rotary switch	This switch selects between various control and feedback parameters.
Navigation toggle switch	This switch navigates up and down through the available control parameters: • **Down**: Moves down through the parameters • **Up**: Moves up through the parameters
Control LEDs	Various lighting combinations of these Control LEDs (sometimes referred to as "Bank Select LEDs") indicate the currently selected bank. See "Bank Select LEDs" on page 34 for more information.
Monitoring LEDs	Each 6800+ module uses LEDs to indicate varying states and functions. See page 59 for details.
Local/remote control jumper	• **Local**: Locks out external control panels and allows card-edge control only; limits the functionality of remote software applications to monitoring • **Remote**: Allows remote or local (card-edge) configuration, operation, and monitoring of the XHD6801+ See page 14 for more information on jumpers.

Back Module

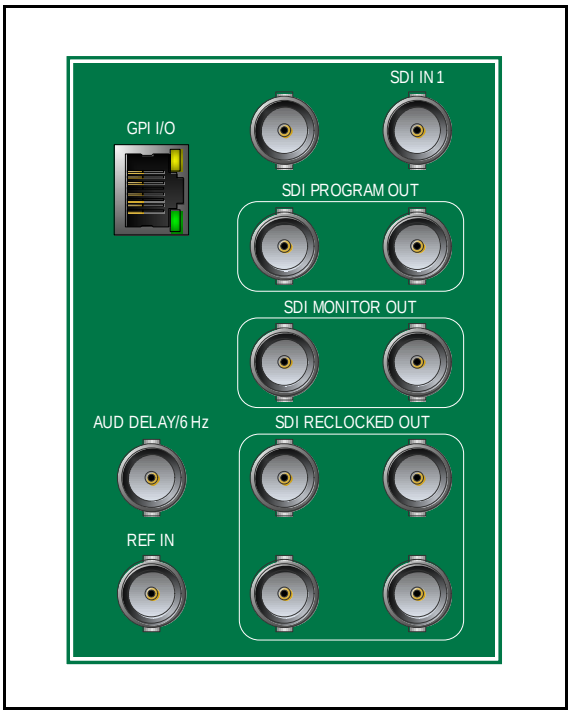


Figure 1-2. XHD6801+ Back Module

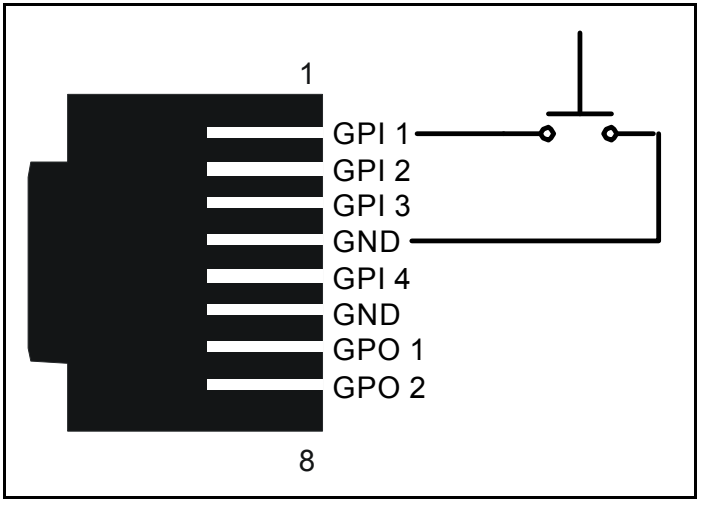


Figure 1-3. GPI In/Out Pinouts

Table 1-2 describes each back module connector.

Table 1-2. Back Module Connector Descriptions

Back Module Label	Description
SDI In	Inputs HD/SD-SDI video for up, down, or cross-conversion or reclocking; HD/SD-SDI signals can also be input for reclocking.
SDI DA Out (4)	Outputs SD or HD reclocked video output signals; video from these outputs by-passes the module's scalar processor; configurable for either reclocked or frame sync outputs
SDI Program Out (2)	Outputs HD/SD-SDI converted video
Audio Delay / 6 HZ	Outputs the output audio delay signal
SDI Program/Monitor Out (2)	Outputs a program signal for monitoring purposes; an on-screen display of XHD6801+ control parameters can be enabled on these outputs
Reference In	Inputs a bi-level (NTSC/PAL-B) or tri-level sync (1080i/1080p) external video reference source that can be internally terminated using a jumper (see page 65 for the video standards supported)
GPI In/Out	Provides four GPI inputs and two GPI outputs for automation (these are open collector style inputs with approximately 10 KΩ pull-ups to +5V that can use "contact closure-to-ground" switches)

Signal Flow

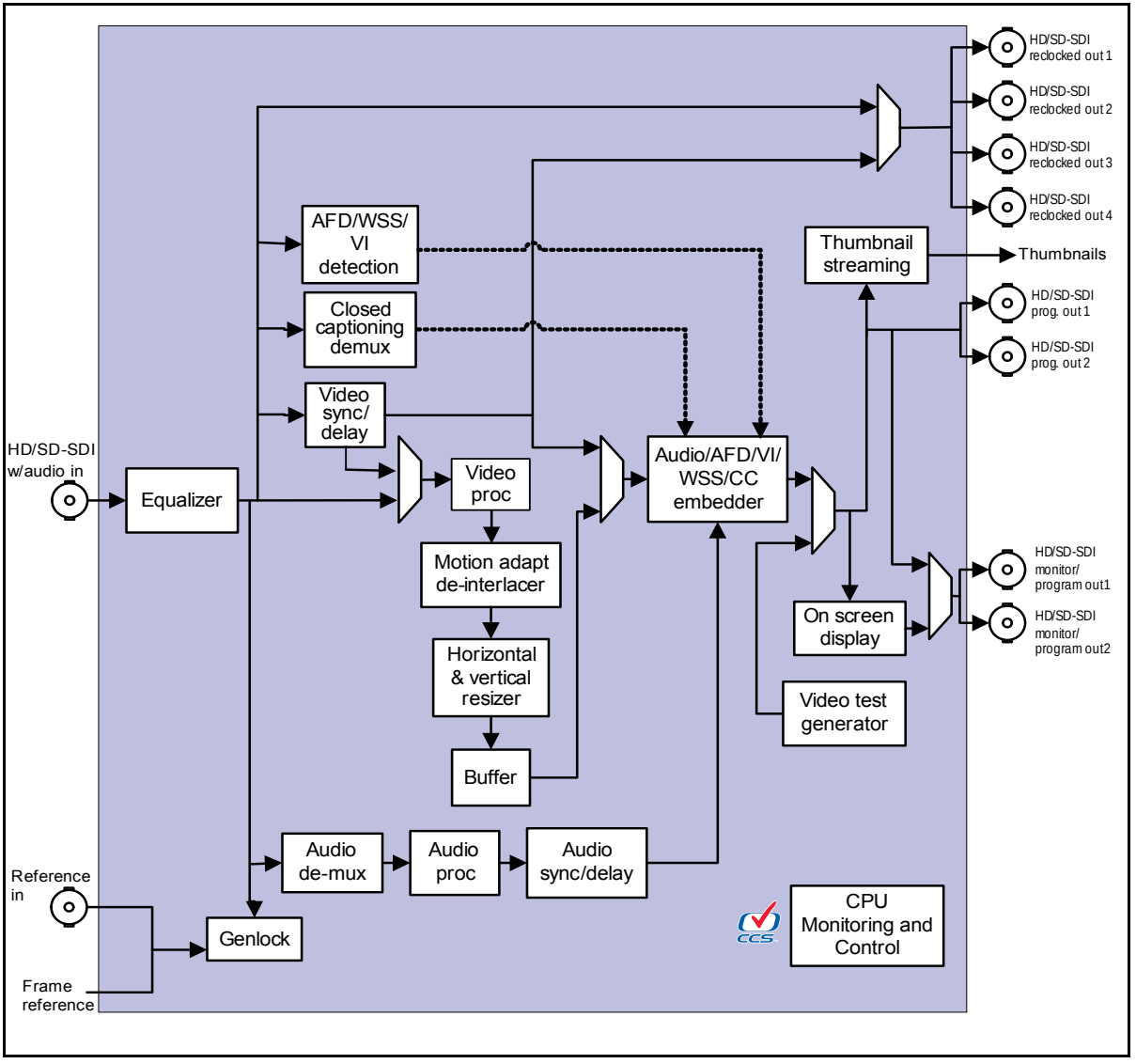


Figure 1-4. XHD6801+ Signal Flow Diagram

Chapter 2

Installation

Overview

This chapter describes the XHD6801+ installation process, including the following topics:

- "Maximum 6800+ Frame Power Ratings" on page 12
- "Unpacking the Module" on page 13
- "Setting Jumpers" on page 14
- "Installing XHD6801+ Modules" on page 17
- "XHD6801+ License Keys" on page 17
- "Upgrading Module Firmware" on page 18

Caution

Before installing this product, read the *6800+ Series Safety Instructions and Standards Manual* shipped with every frame installation and operation manual. This information is also available on our website. The safety manual contains important information about the safe installation and operation of 6800+ series products.

See your frame installation and operation manual for information about installing and operating an FR6802+ frame and its components.

Maximum 6800+ Frame Power Ratings

The power consumption for one XHD6801+ module is 17.5 W. Table 2-1 shows the maximum allowable power ratings for 6800+ series frames. Note the given maximums before installing any 6800+ modules in your frame.

Due to high levels of heat dissipation, XHD6801+ modules should not be installed in frames without fans. The modules cannot be installed in FR6802+DM and 6800/7000 series frames.

Note

To maintain proper temperatures, ensure that the front panel is closed at all times, and that the fan module is fully operational.

Table 2-1. Maximum Power Ratings for 6800+ Frames

6800+ Frame Type	Max. Frame Power Dissipation	Max. Number of XHD6801+ Modules	Max Power Dissipation for Three Slots*
FR6802+QXF (frame with AC or DC power supply)	120 W	6	18 W
FR6802+XF (frame with AC power supply)	120 W	6	18 W
FR6802+XF48 (frame with DC power supply)	105 W	5	15.75 W**
FR6822+/ FR6822+QXFE	120 W	6	18 W

* Each front module requires three slots.

** Although XHD6801+ modules require more than 15.75 Watts over three slots, the actual consumption is considered acceptable if no more than 5 modules are installed.

Caution

Heat sinks on the XHD6801+ require extra clearance. To prevent damage to components, ensure that you do not insert the front module in slots 6, 14, 19, or 20.

Unpacking the Module

Preparing the Product for Installation

Before you install the XHD6801+, perform the following:

- Check the equipment for any visible damage that may have occurred during transit.
- Confirm receipt of all items on the packing list. See "Checking the Packing List" below for more information.

Note

Contact your Customer Service representative if parts are missing or damaged.

- Remove the anti-static shipping pouch, if present, and all other packaging material.
- Retain the original packaging materials for possible re-use.

See "Unpacking/Shipping Information" on page ix for information about returning a product for servicing.

Checking the Packing List

Table 2-2. Available Product Packages

Ordered Product	Content Description
• XHD6801+UC up/ crossconverter • XHD6801+D downconverter • XHD6801+UCD up/ cross/downconverter	• One front module • One back module • One XHD6801+ *Broadcast-Quality Up/ Cross/Downconverter Installation and Operation Manual*

Setting Jumpers

The XHD6801+ module has the following jumper settings:

- “Local/Remote Jumper” on page 14
- “External Reference Termination Jumper” on page 15
- “Input/Output Audio Delay/6 Hz Jumper” on page 16

Figure 2-1 shows the location of the jumpers.

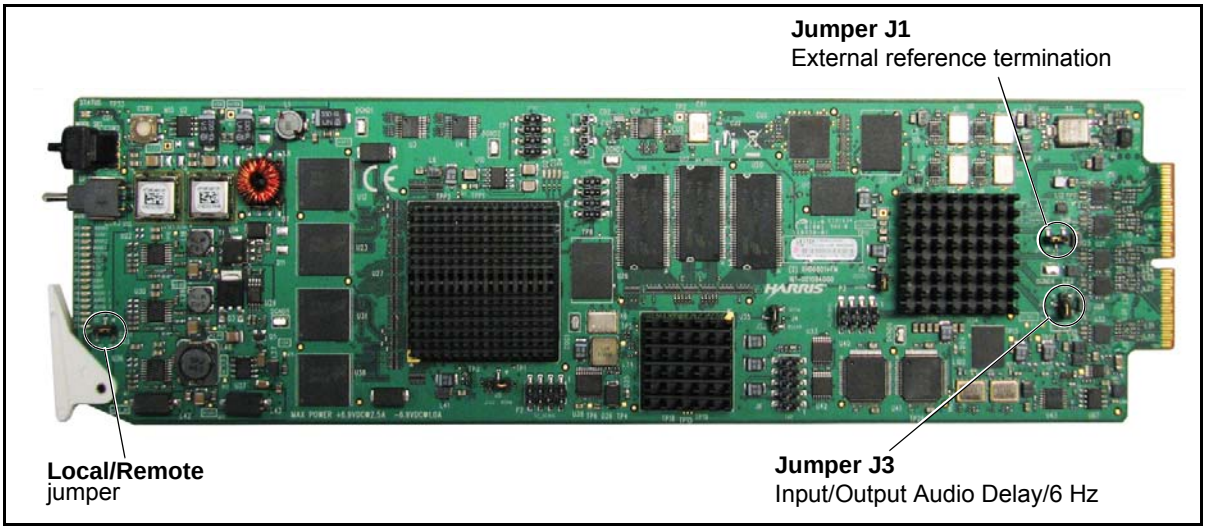


Figure 2-1. XHD6800+ Jumpers

Local/Remote Jumper

Follow this procedure to set the **LOC/REM** jumper for either local or remote control:

1. Locate the **LOC/REM** control jumper on the module (beside the mode select rotary switch). Figure 2-1 on page 14 shows the standard location of the **LOC/REM** jumper.

2. Place a jumper on pins **1** and **2** to set the module for Remote control, or pins **2** and **3** to set the module for Local control. See Figure 2-2.

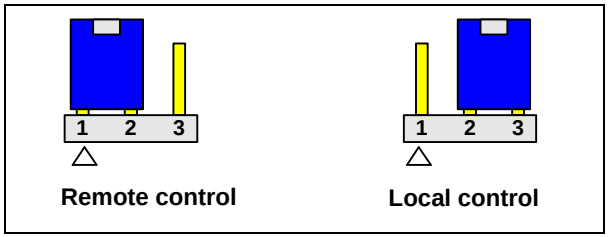


Figure 2-2. Remote/Local Control Settings

Note

You must configure modules for local or remote operation *prior* to power-up. To change the configuration, first remove power from the module, reset the jumper, and then reapply power. The white triangle near the jumper pins on the module indicates pin **1**.

See Table 1-1 on page 7 for more information on local/remote control jumper functionality.

External Reference Termination Jumper

Follow this procedure to set the external **Reference Input Termination** jumper:

1. Locate jumper **J1** on the module.

   (Figure 2-1 on page 14 shows the location of the jumper.)

2. Place a jumper on pins **1** and **2** to set the module for **75Ω Termination**, or pins **2** and **3** for **No Termination** (see Figure 2-3).

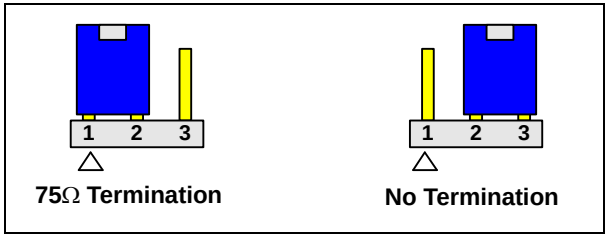


Figure 2-3. Genlock Termination Settings

Input/Output Audio Delay/6 Hz Jumper

Follow this procedure to set the **Input/Output Audio Delay/6 Hz** jumper:

1. Locate jumper **J3** on the module**.**

   (Figure 2-1 on page 14 shows the location of the jumper.)

2. Place a jumper on pins **1** and **2** to set the module for 6 Hz input, or pins **2** and **3** to set input/output audio delay output (see Figure 2-3).

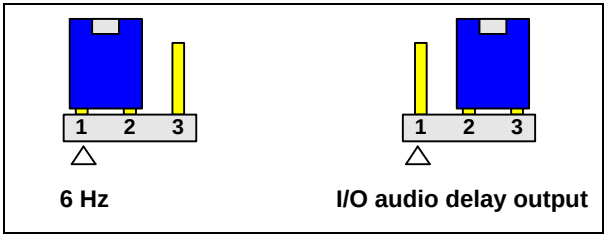


Figure 2-4. Genlock Termination Settings

Installing XHD6801+ Modules

XHD6801+ products have triple-width back modules. These products cannot be installed in frames without fans, or in FR6802+DM and 6800/7000 series frames.

See the *FR6802+ Frames Installation and Operation Manual* for information about installing and operating an FR6802+ frame and its components.

XHD6801+ License Keys

Table 2-3 lists the available XHD6801+ feature upgrade license keys.

Table 2-3. Available License Keys

License Key Order Number	Feature Upgrade
XHD6801+D-UCD	Downconverter upgraded to full up/cross/ downconversion capability
XHD6801+UC-UCD	Up/crossconverter upgraded to full up/cross/ downconversion capability

To enter a license key, you must use a NUCLEUS control panel, or a CCS software application, such as CCS + Pilot Lite, Pilot, or Navigator. See page 36 for information about entering license keys.

Upgrading Module Firmware

Firmware upgrading is a routine procedure that you must perform to install newer versions of software on 6800+ modules. CCS Pilot, Co-Pilot, or Navigator software version 3.1.1 or later is required for this procedure. The frame must contain or be connected to another frame that contains an ICE6800+ or a 6800+ETH module. During the upgrade procedure, the affected modules are automatically rebooted.

In the unlikely event that the upgrade fails (because of such situations as network interruptions, power failures, etc.), the module may not respond to controls and will appear to be non-functional. In that event, follow the procedures described in “Correcting a Failed Upgrading Procedure” on page 21.

Upgrading the Firmware

You can upgrade your 6800+ module’s firmware using the Software Upgrade tool. This tool is included with CCS Pilot, Co-Pilot, or Navigator software version 3.1.1 or later.

Caution

The **File Transfer** tab is not meant to be used for firmware upgrades. Use the Software Upgrade tool to upgrade module firmware.

To upgrade your module’s firmware, follow these steps:

1. Download the most recent appropriate upgrade package from our website or from your CD-ROM.
2. If the affected module has not been discovered, perform the Discovery operation.

Note

You can find information about discovering modules in your CCS software application manual or online help. (If you cannot discover the device, see “Manually Adding a Device to the Discovery or Network Folder” on page 22.)

3. From the **Tools** menu, select **Software Upgrade**.

   The **Software Upgrade** window opens or is brought to the foreground.

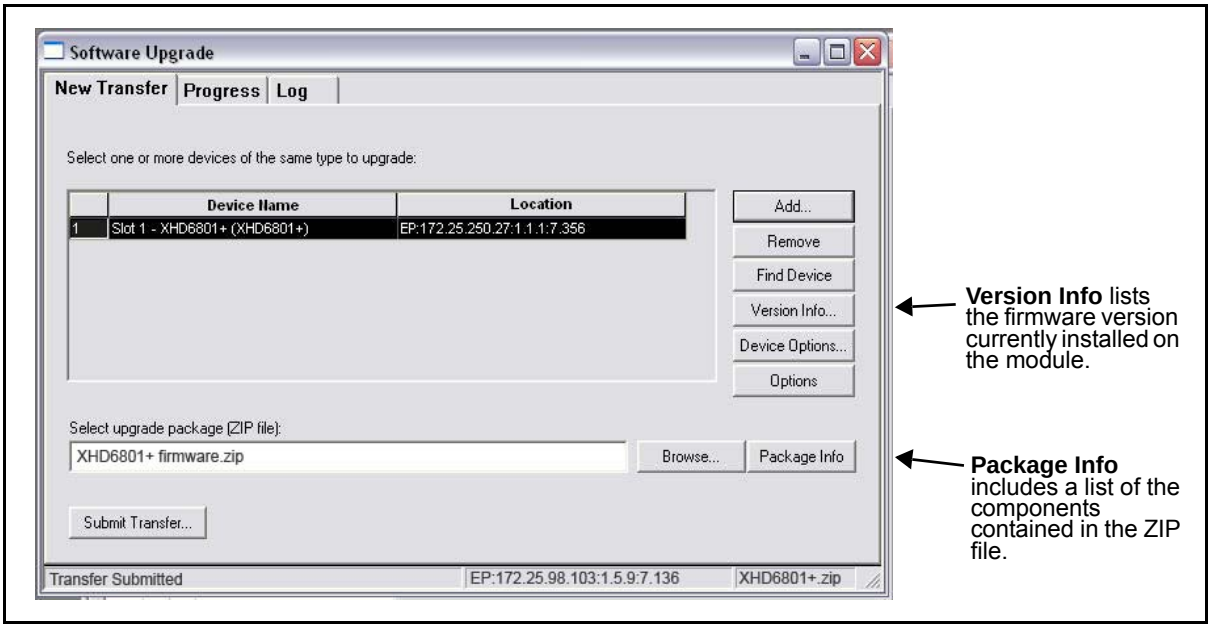


Figure 2-5. Software Upgrade Tool's New Transfer Tab

4. On the **New Transfer** tab, click **Add**.

   The **Device Selection** dialog box opens.

5. Select one or more devices, and then click **OK** to close the **Add Device** dialog box.

   Note

   You can only add one device from each IP address. All items in a frame have the same IP address.

   The selected devices appear in the table under **Device Name**. These devices will receive the same upgrade package.

6. Before proceeding with the firmware upgrade, you can—

   - Highlight the module's position in the Navigation window by clicking **Find Device**.

- View the firmware version currently installed on the module by clicking **Version Info**.

7. Press **Browse...** to select the firmware upgrade package (ZIP file).

   A standard **Windows File Selection** dialog opens.

8. Choose the upgrade ZIP file on a local or network drive.

   The selected file's path name is displayed in the edit box to the left of the **Browse…** button.

Note

The extraction process of the ZIP file is handled as part of the upgrade process. You do not need to extract the files yourself. You can view the contents of the ZIP file by clicking **Package Info.**

9. Press **Submit Transfer...**

   A dialog box opens, requesting confirmation that you want to proceed with the request. If you have multiple devices selected, multiple transfer tasks are submitted—one per device.

   The transfer now progresses. You may minimize the **Software Upgrade** window, continue with other tasks, or switch to the **Progress** tab to view the status of the transfers.

Note

Closing the **Software Upgrade** window does not effect any of the transfer processes that may be running in the background. If you try to log off or exit the CCS software while a transfer is underway, a notification window will alert you that processes are still active and will ask if you want to terminate these processes.

10. To monitor the progress of the firmware upgrade procedure, click the **Progress** tab. When the firmware upgrade is complete, **Completed** is displayed in the **Transfer Status** column.

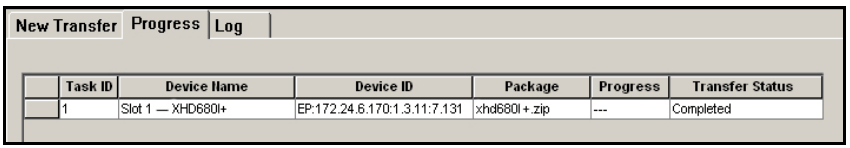


Figure 2-6. Firmware Upgrade Complete

Correcting a Failed Upgrading Procedure

Firmware upgrades may fail in the event of network interruptions, power failures, or if the wrong upgrade package was transferred to the module. These problems can be corrected by upgrading the firmware while the module is in Boot Loader mode. The upgrade won't work unless you put the module in Boot Loader mode.

Note

If you have not already downloaded the most recent appropriate upgrade package from our website or from your CD-ROM, do so now.

Putting the Module in Boot Loader Mode

Follow these steps to put your the module in Boot Loader mode:

1. Remove the affected module from the 6800+ frame.

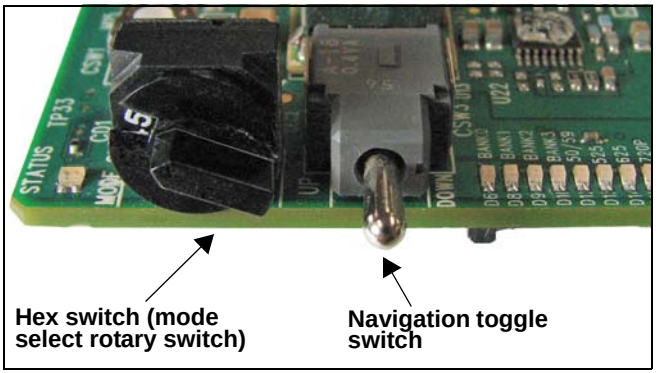


Figure 2-7. Buttons on a Typical Card Edge

2. Set the hex switch to **F**.
3. While pressing the Navigation toggle switch down, reinsert the module into the frame.

If your device is listed in the **Discovery** or **Network** folder, you can continue the firmware upgrade as described in "Upgrading the Firmware" begining with step **3** page 18. If not, you must manually add the device to the **Discovery** or **Network** folder. To do this, see the next section.

Manually Adding a Device to the Discovery or Network Folder

If your device is not listed in the **Discovery** or **Network** folder, you must manually add it to these folders. After you add the device, you can use the **Software Upgrade** dialog box to continue with the module firmware upgrade.

To manually add a device to the **Discovery** or **Network** folder, follow these steps:

1. Enter Build mode, and then drag or copy and paste the module's device icon from the **Catalog** folder into the **Network** or **Discovery** folder.
2. Right-click the device icon, and then select **Properties**.
3. On the **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-8.)

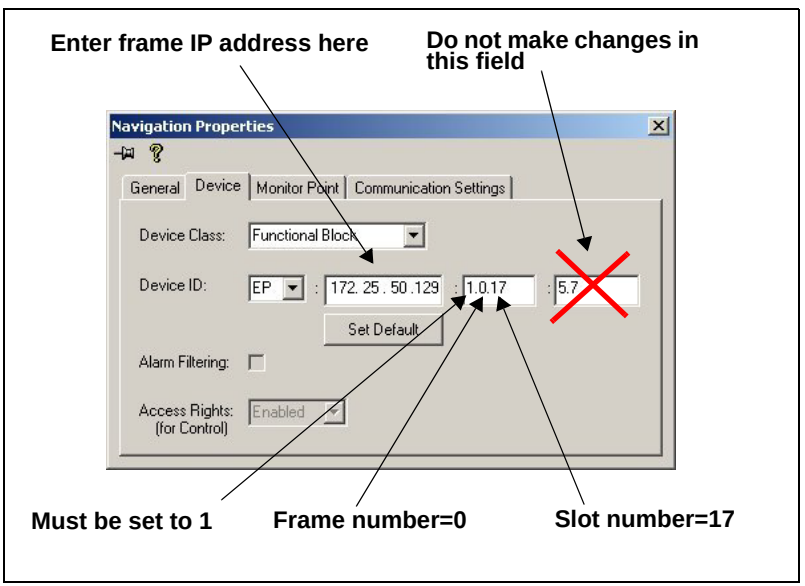


Figure 2-8. Navigation Properties Box

Caution

Do not make changes in the last field (located above and to the right of the **Set Default** button). If you do, you will need to begin the process of adding devices to the **Discovery** or **Network** folder again.

4. In the third field, enter

   `1.0.[slotnumber]`

   (where, for example, 1.0.5 would refer to the module in slot 5 of the frame number 0).

5. Close the window.

6. You can now continue your firmware upgrade as described in "Upgrading the Firmware" begining with step **3** on page 18.

Chapter 3

Configuration and Operation

Overview

This chapter describes how to operate the XHD6801+ using card-edge controls or CCS software and hardware controls.

The following topics are discussed in this chapter:

- "Operating Notes" on page 26
- "Video Processing Modes" on page 27
- "Q-SEE Compliant Thumbnails" on page 30
- "Changing Parameter Settings" on page 32
- "Entering License Keys" on page 36
- "Aspect Ratio Processing" on page 37
- "Active Format Description" on page 40
- "Closed Captioning and DVB Teletext Captioning" on page 52
- "Audio Configuration" on page 53
- "GPI" on page 56
- "Video Keying" on page 56

Operating Notes

When setting the control parameters on the XHD6801+, observe the following:

- When you change a parameter, the effect is immediate. However, the module requires up to 20 seconds to save the latest change. After 20 seconds, the new settings are saved and will be restored if the module loses power and must be restarted.
- For proper operation, the output HD standard frame rate should match or double the reference standard frame rate.
- The manufacturer recommends that you terminate any unused coaxial output connectors with a 75Ω connector.

Video Processing Modes

The XHD6801+ operates in three fundamental video processing modes. These modes are available in all three XHD6801+ versions (XHD6801+UC, XHD6801+D and XHD6801+UCD).

Note

Some user controls such as input and output video standard, phasing, and LOV may operate differently between the processing modes. Also, there are some requirements on the video format on each of the outputs, and these requirements vary between the processing modes.

Mode 1: Scaled Outputs with Re-clocked Inputs

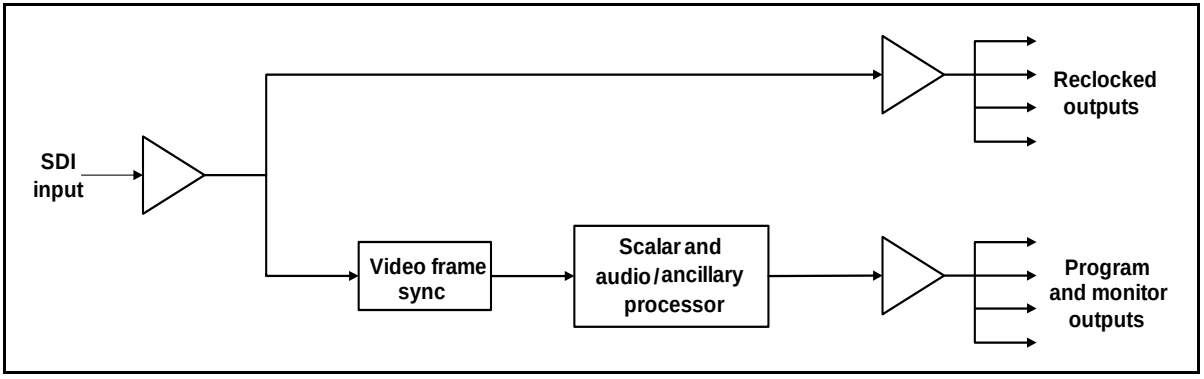


Figure 3-1. Scaled Outputs with Re-clocked Inputs

This mode is active when you select **Reclock** in **Video** > **Output** > **DA Output Select.**

Four re-clocked outputs of the input video with four scaled outputs are available in this mode. This makes it possible to configure the XHD6801+ as a combined four-output DA and a four-output up/cross/downconverter. The following special features and limitations apply to this video processing mode:

- The input video standard control (**Video** > **Input** > **SDI Input Standard Set**) applies to the video frame synchronizer only and has no effect on the re-clocked outputs. If the input video format does

not match the input standard control setting or if the input video is lost, both frame synchronizer and the scalar processor will operate in LOV mode.

- The output video standard of the scalar is selectable through the scalar output video standard control (**Video > Output > Output Video Standard Select)**. However, the video format of the re-clocked outputs is not controllable and is always the same as the input video format.
- The horizontal and vertical phasing controls will apply to both video frame synchronizer and scalar processing as a single block. The phasing controls (**Video > Processing > Synchronizer**) have no effect on the re-clocked outputs.
- If the input video format does not match the input standard control setting or if the input video is lost, the program and monitor outputs will either be frozen, undetermined (pass mode), or black—according to the LOV mode setting (**Video > Output > Primary LOV Mode**). However, the LOV mode does not apply to re-clocked outputs. The re-clocked outputs will be undetermined if the input video format is not supported, or if the input video is lost.

Mode 2: Frame Sync and Scalar Outputs

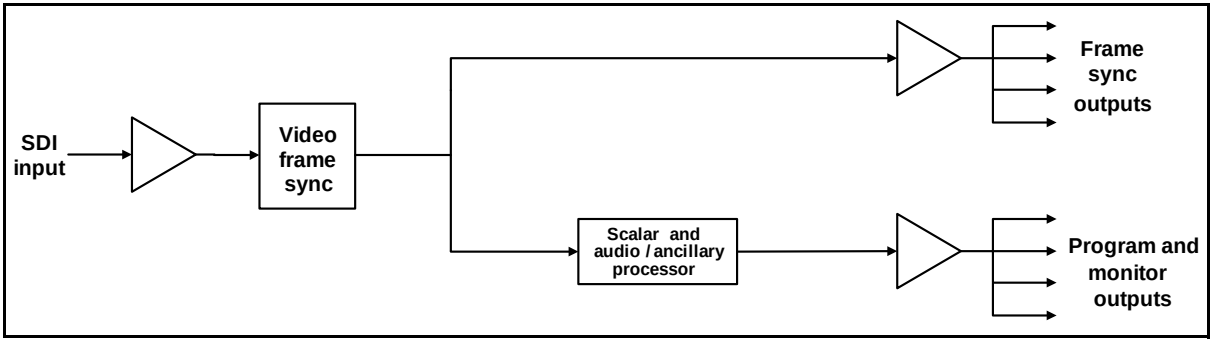


Figure 3-2. Frame Sync and Scalar Outputs

This mode is active when you select **FS Mode 1** in **Video > Output > DA Output Select**.

In this mode, there are four frame synchronized outputs of the input video and four scaled outputs available. The scalar processor is located after the video frame synchronizer on the same path. However, putting both the frame synchronizer and the scalar on the same path prevents you from changing the phase relationship between the frame synchronized outputs and the scalar outputs. The following special features and limitations apply to this video processing mode:

- The input video standard control applies to both the video frame synchronizer and the scalar processor (**Video > Input > SDI Input Standard Set**). If the input video format does not match the input standard control setting, or if the input video is lost, both the frame synchronizer and the scalar processor will operate in the LOV mode.
- The output format of the scalar is selectable through the scalar output video standard control (**Video > Output > Output Video Standard Select)**. However, the output video format of the frame synchronized outputs is controlled by the input video standard control.
- The horizontal and vertical phasing will apply to both video frame synchronizer and scalar processing as a single block (**Video > Processing > Synchronizer**). In other words, you cannot adjust the phase relationship between the frame synchronizer outputs and the scalar outputs. The scalar outputs will always lag the frame synchronizer outputs by a fixed number of video frames (the amount of propagation delay through the scalar processor).
- If the input video format does not match the input standard control setting or if the input video is lost, the program and monitor outputs will either be frozen, undetermined (pass mode), black, or test pattern—according to the LOV mode setting (**Video > Output > Primary LOV Mode**). The frame synchronizer outputs will also either be frozen, undetermined (pass mode), or black.

Mode 3: Discrete Frame Sync and Scalar Outputs

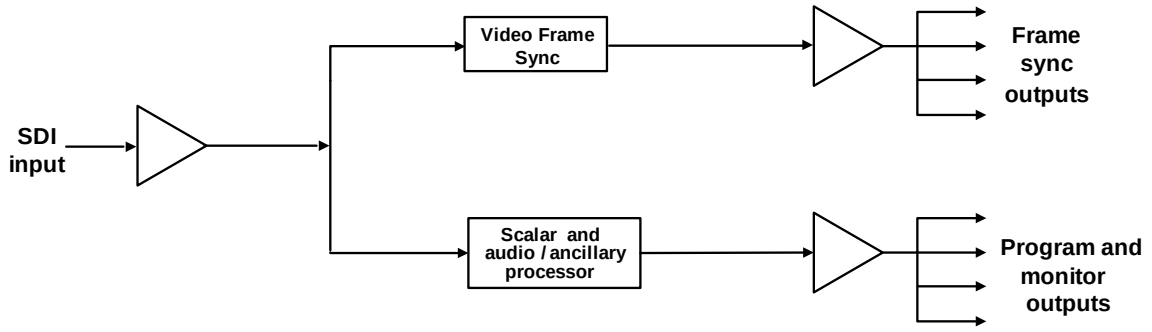


Figure 3-3. Discrete Frame Sync and Scalar Outputs

This mode is active when you select **FS Mode 2** in **Video > Output > DA Output Select.**

In this mode, there are four frame synchronized outputs of the input video and four scaled outputs available. The scalar processor is not located after the video frame synchronizer on the same path.

Q-SEE Compliant Thumbnails

The OP+TDMR+8 and OP+TDMT+8 modules support Q-SEE compliant thumbnails. To use Q-SEE compliant features, you must install the modules in an FR6822+QXFE frame or an FR6802+QXF frame that also contains a 6800+ETH module. When you open a **Control** window in CCS Pilot or Navigator for the 6800+ETH module, all Q-SEE compliant modules provide thumbnails on a **Video Streaming** tab. In addition, the OP+TDMR+8 and OP+TDMT+8 module **Control** windows have a **Streaming** tab where a thumbnail is displayed and updated at up to three frames per second.

Q-SEE-compliant thumbnails are available for all inputs, but only one can be viewed at a time.

The following standards are supported:

59.94 Hz Operation

- 525
- 720p/59
- 1080i/59

- 1080p/29.97
- 1080p/23.98

50 Hz Operation

- 625
- 1080i/50
- 1080p/25
- 720p/50

For more information on Q-SEE compliant thumbnails, see your *FR6802+QXF* or *FR6822+QXFE Frames Installation and Operation Manual*.

Changing Parameter Settings

There are two ways to change the parameters that control your module's operation: CCS software applications and card-edge controls.

Using CCS software applications, such as + Pilot Lite, Pilot, or Navigator, you can view, set, and confirm your module's parameter settings from your computer's monitor. Using the card-edge controls, you can set parameters using the module's rotary hex and navigation switches.

You can use the information in this chapter to configure and operate your XHD6801+ using a CCS software application or the module's card-edge controls. For more information about setting parameters using CCS software application or by using the module's card-edge control, see "Changing Parameters Using CCS Software" on page 32 and "Changing Parameter Settings Using Card-Edge Controls" on page 33 respectively.

A complete list of XHD6801+ control parameters can be found in Chapter 4: "Parameters, LEDs, and Alarms" on page 57.

Changing Parameters Using CCS Software

Before using CCS software applications or hardware controls to change your module's parameter settings, you must refresh (+ Pilot Lite) or discover (Pilot and Navigator) the module. Refresh and Discovery are the processes by which your CCS software finds, and then connects to your module.

Refreshing Your Module Using + Pilot Lite

When using + Pilot Lite to change your XHD6801+ control parameters, you must "refresh" the control connection between your 6800+ frame and PC. To refresh the connection, from the + Pilot Lite menu bar, select **File** > **Refresh**. For information about controlling a device using + Pilot Lite, see your + Pilot Lite *User Manual*.

Discovering an XHD6801+ Module

To discover your module, your Pilot or Navigator software must be in Build mode. Follow these steps:

1. If the Discovery window is not open, click **Tools** > **Discovery** in the main menu.

   A **Discovery** window opens, most likely in the bottom left corner of the screen.

2. Click **Options**, and then click **Add**.
3. Enter the IP address of the frame that contains your module, the frame that contains your ICE6800+ module, or the frame that contains a 6800+ETH module that provides access to your module.
4. Click **OK** to close the **Add IP address** window, and then **OK** again to close the **Discovery Options** window.
5. Click **Start**.

   This triggers Pilot or Navigator to run a discovery.

6. When your discovery is complete, **Discovery Completed** is displayed in the **Discovery** window.
7. To continue, click **Save**, to save the contents of your discovery to the **Discovery** folder of the **Navigation** pane.

You can now switch to Control mode by selecting **Operational Mode** > **Control**. Double-click XHD6801+ in the Navigation pane. The **Control** window opens and displays the module's controls.

Changing Parameter Settings Using Card-Edge Controls

Using the module's rotary and navigation switches, you can change XHD6801+ parameter settings at the card-edge. You can view and confirm your changes using the On-screen display feature (see "Enabling On-Screen Display" on page 35).

Follow these steps to change the parameter settings at the card edge:

1. Rotate the mode select rotary switch (hex switch) to **0**.

2. Once the hex switch is set to **0**, toggle the navigation switch up or down to select a bank.

   View the control LEDs next to the navigation toggle switch. A lit LED indicates which bank is currently selected.

Table 3-1. Bank Select LEDs

Bank Number	Bank 0 LED (first top LED)	Bank 1 LED (second top LED)	Bank 2 LED (third top LED)	Bank 3 LED (fourth top LED)
0	Off	Off	Off	Off
1	On	Off	Off	Off
2	Off	On	Off	Off
3	On	On	Off	Off
4	Off	Off	On	Off
5	On	Off	On	Off
6	Off	On	On	Off
7	On	On	On	Off
8	Off	Off	Off	On
9	On	Off	Off	On
10	Off	On	Off	On
11	On	On	Off	On
12	Off	Off	On	On
13	On	Off	On	On
14	Off	On	On	On
15	On	On	On	On

3. Rotate the hex switch to the parameter number (**1** to **9**) or letter (**A** to **F**) of the option you want to set.
4. Toggle the navigation switch to select and set the value of the chosen parameter.

5. Rotate the hex switch to another parameter number/letter in the current bank, and then repeat step 4.

   or

   Rotate the hex switch to **0** again to select a different bank, and then repeat steps 3 and 4.

Note

Harris recommends that you use the software controls to aid in viewing, setting, and confirming parameter values.

Enabling On-Screen Display

You can use the On-screen Display (OSD) monitoring feature to view the current parameter selections on your output display. When the **On-Screen Display** parameter is turned on, the current parameter selections are displayed on the module's **SDI Program/Monitor Out 1** and **SDI Program/Monitor Out 2** outputs. This features makes configuring the XHD6801+ using the card-edge controls much easier.

To enable OSD monitoring, select **Video** > **Output** > **Config** > **On-Screen Display**. To change the transparency of the OSD, select **Video** > **Output** > **Config** > **OSD Transparency.**

OSD can be turned **On/Off** at the card edge, using Bank **0**, Switch **2** (**0,2**).

Recalling Default Parameter Settings

You can use the module's **Factory Recall** parameter to return all of the module's parameters to factory default settings. To return this module to its default settings, select **Other** > **Factory Default** > **Yes**.

Reading Software and Hardware Versions

You can see the current software and hardware versions of the XHD6801+ by checking the **Hardware Version** and **Firmware Version** read-only parameters near the end of the parameter list (see "Control Parameters" on page 58). These parameters appear in the on-screen display and in CCS software applications.

Entering License Keys

Optional license keys are available to add new capabilities to your existing module. (Contact your product sales representative for details.)

Before you purchase a license key, you must obtain your module's serial number. Select **Other** > **Serial Number**. The module's current capabilities are shown when you select **Other** > **Options**.

Table 3-2 lists the available XHD6801+ upgrade license keys.

Table 3-2. Available Upgrade License Keys

Module Type Before Upgrade	License Key Upgrade	Module Type After Upgrade
XHD6801+UCT	Up/cross/downconversion (XHD68+-UC-UG-UCD)	XHD6801+UCDT
XHD6801+DT	Up/cross/downconversion (XHD68+-D-UG-UCD)	XHD6801+UCDT

You can use a CCS software application, such as CCS +Pilot Lite, Pilot, and Navigator, as well as NUCLEUS control panels to enter license keys. Additionally, you can enter the license keys with a web browser if your module is in a frame with (or connected to a frame with) a 6800+ETH+HTTP module. License keys cannot be entered at the module's card edge, but you can view the **License Key** parameter if the **On Screen Display** parameter is enabled.

Using CCS, you can enter your license key by selecting **Other** > **License Key**.

To confirm that your license key has been accepted and activated, select **Other** > **Options.**

Note

Before you can enter and activate your upgrade license key, you must either Refresh or Discover your XHD6801+ module as described in "Refreshing Your Module Using + Pilot Lite" on page 32 and "Discovering an XHD6801+ Module" on page 33.

Aspect Ratio Processing

The XHD6801+ offers a highly configurable and comprehensive feature set for processing aspect ratio codes and determining ARC settings. ARC control and AFD/WSS/VI code insertion control can track, but can also operate independently from each other. In addition, user-defined mapping makes it possible to have complete control over what ARC and code is inserted for any given input of AFD, WSS, or VI code. The aspect ratio features described here require a 6800+ETH resource module firmware of at least version 4.2.

Enhanced Aspect Ratio Conversion Control

GPI triggers can modify the aspect ratio conversion control for each mode of operation separately. In other words, you can change the ARC for upconversion without affecting the ARC for down- or crossconversion. For example, if the XHD6801+ is in upconversion mode, the GPI can only change the upconversion ARC setting. This capability makes it possible to control the ARC control for any mode, regardless of which mode is currently active.

A user-selectable ARC setting is provided in the event that AFD, WSS, or VI code disappears. For example, if upconversion is set to follow AFD, but the AFD data isn't available, the user can choose which ARC to implement in its place.

Enhanced AFD/WSS/VI Insertion

GPI triggers can affect the insertion mode and insert specific codes for AFD, WSS, and VI. Each control is separate and independent from the other.

Enhanced Monitoring

GPI outputs on the XHD6801+ can perform the following:

- Monitor for specific input AFD, WSS, and VI codes
- Separately monitor the ARC setting for each conversion mode
- Report the current AFD, WSS, or VI insertion mode in use for a particular type of conversion

Enhanced User ARC Settings

Each user setting includes default AFD, WSS and VI code associated with it. A **Live View** mode makes it possible to see custom ARC adjustments in real time.

Custom Code Map

With the custom code map, you have the ability to precisely specify the ARC setting and code insertion for each input AFD, WSS, and VI code, including reserved codes. You can override only the code insertion, the ARC setting, or both. In addition, you can override specific AFD, WSS, or VI codes and leave the remainder as default.

The map can be used to create custom **AFD In** to **AFD Out** mappings, as well as custom translation from any incoming AFD, WSS, and VI to insert any AFD, WSS, and VI code.

GPI triggers make it possible to switch between standard mapping and custom mapping for each conversion mode separately.

Selecting a Standard Aspect Ratio

To select a standard aspect ratio for the output image, set ARC Control (found at **Video > Processing > ARC > ARC Control**) to one of the following selections:

- Anamorphic
- 4:3 Pillar Box
- 14:9 Pillar Box
- 16:9 Cut
- 4:3->21:9 Ltr
- 16:9 Letter Box
- 14:9 Letter Box
- 4:3 Cut
- 16:9->21:9 Ltr
- PixelTrue

Pixel True performs no scaling to the input video. Instead, each input pixel is mapped directly to one output pixel. You can use this preset to transport an SD picture embedded inside an HD stream.

Selecting a Custom Aspect Ratio

To select a pre-defined custom aspect ratio for the output image, use one of the options found at **Other > GPI Input > ARC Control**:

- **Custom Up ARC1** to **Custom Up ARC5**
- **Custom Down ARC1** to **Custom Down ARC5**
- **Custom Cross ARC1** to **Custom Cross ARC5**
- **Custom SD ARC1** to **Custom SD ARC5**

Only five options are exposed at one time, based on the mode selected.

Selecting Aspect Ratio Control Following AFD, VI, WSS

An XHD6801+ module can automatically change the aspect ratio, based on the incoming AFD, WSS, or VI control codes. Set the **ARC Control** parameter to one of the following selections (some options are not available, depending upon the selected conversion mode):

- AFD
- AFD - ALTR
- AFD - Custom Map
- VI
- VI - ALTR
- VI - Custom Map
- WSS
- WSS - ALTR
- WSS - Custom Map

The **AFD**, **WSS**, and **VI** selections follow standard ARC recommendations. For instance, selecting **AFD** causes the module to set the ARC setting according to the incoming AFD code, **-ALTR** selections use the alternate ARC method, and **Custom Map** follows the user defined ARC settings for each individual code. See “Active Format Description” on page 40 for more details about custom mapping.

Setting a Custom Aspect Ratio

You can scale and pan the output image to any size and location by using the various parameters of the custom aspect ratio settings. These parameters include: **Horizontal Offset, Vertical Offset, Horizontal Scale, Vertical Scale, Crop Left, Crop Right, Crop Top,** and **Crop Bottom**. These parameters can be individually modified, or batch-modified by recalling a standard aspect ratio or a pre-defined custom aspect ratio.

Setting **Live Edit View** to **On** will actually make the custom aspect ratio settings take effect immediately on the output. This is useful when trying to visually align the various parameters.

Custom aspect ratios are configured by choosing a custom aspect ratio name from **Save ARC**s selections.

All of the related controls can be found at **Video > Processing > ARC > Custom ARC.**

Active Format Description

Active Format Description (AFD) transmits data in the VANC portion of the SDI signal, enabling both 4:3 and 16:9 television monitors to optimally present video with preset ARC and safe area information. Without AFD, converted video may appear distorted or “cut off” when it appears on different monitors. The XHD6801+ can encode or decode AFD; it can also encode or decode earlier Video Index (VI) and Wide Screen Signaling (WSS) formats.

The AFD feature of the XHD6801+ complies with SMPTE 2016 and includes nine possible 4:3 configurations and eight possible configurations in 16:9. Figure 3-7 on page 46 describes the 4:3 AFD configurations; Figure 3-8 on page 47 describes the 16:9 AFD configurations.Figure 3-4 shows two comparisons of a signal that is encoded with AFD and without AFD.

AFD/ARC Alignment

When you use AFD to select which aspect ratio to apply, the XHD6801+ensures that the AFD codes and associated image will remain in sync. For example, during a hotswitch, the new ARC will only be applied to the new image. There are a few cases which could cause AFD/ARC misalignment:

- The ARC applied is reducing the image vertically such that the new image is less than 60% of the original image.
- The output standard is set to either 1080p/23.98 or 1080p/29.97.

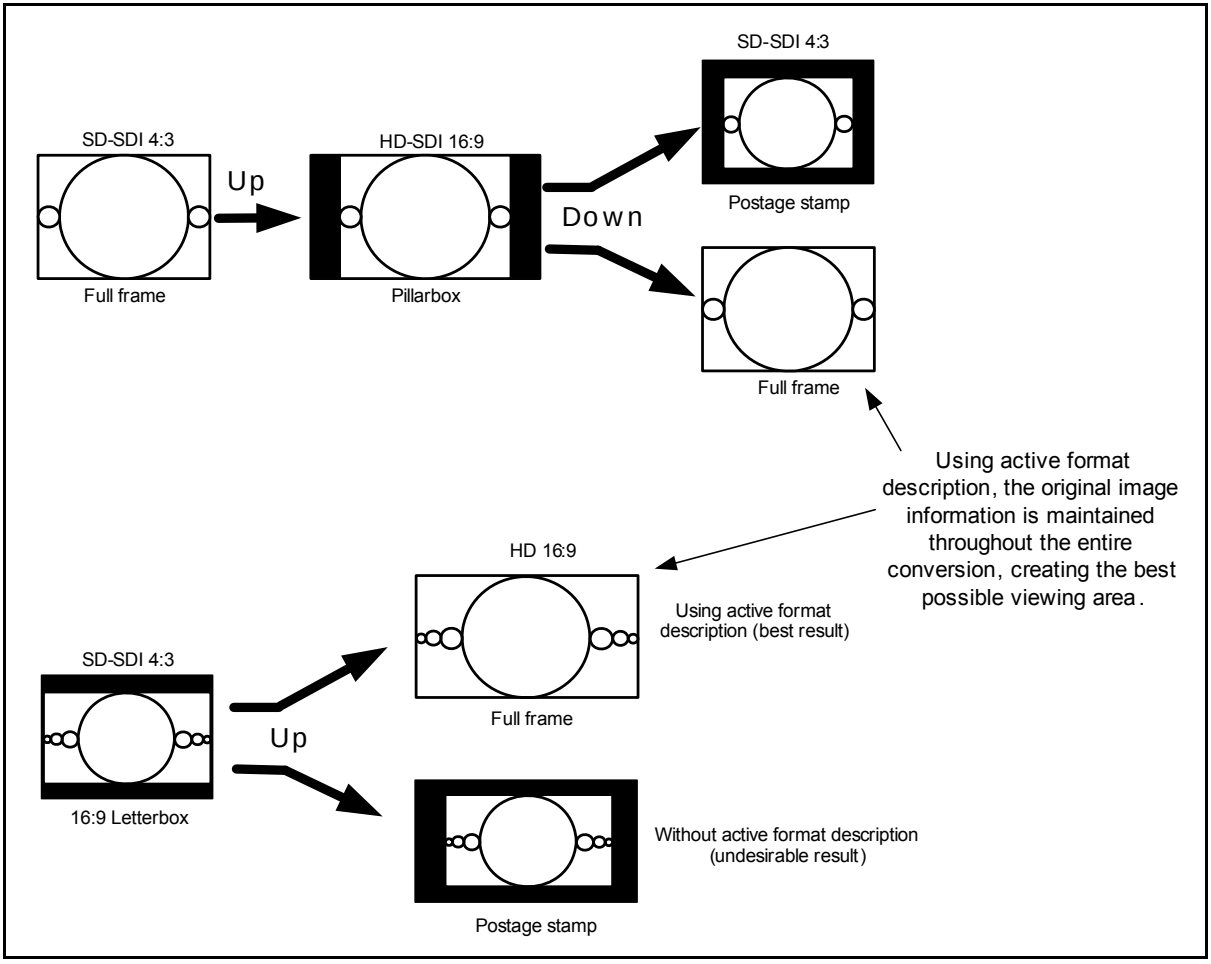


Figure 3-4. AFD/Non-AFD Comparisons

Figure 3-5 shows different applications of AFD insertion and decoding.

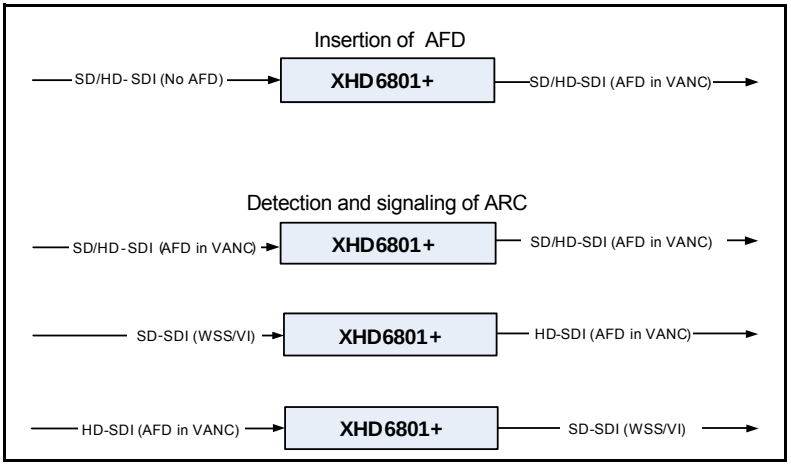


Figure 3-5. AFD Block Diagram

The AFD feature of the XHD6801+ includes nine possible SD-SDI configurations and eight possible configurations in HD-SDI. Figure 3-9 on page 48 describes the SD-SDI AFD configurations; Figure 3-10 on page 49 describes the HD-SDI AFD configurations.

AFD, VI, and WSS Detection

AFD, VI, and WSS data that is embedded in the incoming video can be detected by the XHD6801+, and read from the following input parameters that are found in the **Processing** > **ARC** > **Status** path:

- AFD Present
- VI Scan Present (Use the **VI Detect Line Field 1** and **VI Detect Line Field 2** parameters to determine where in the video signal to look for VI information)
- VI AFD Present
- WSS Present (Use the **WSS Detect Line** parameter to determine where in the video signal to look for WSS information)

AFD, VI and WSS Code Insertion

AFD, VI and WSS data can be passed from input to output, or it can be generated manually or automatically by the XHD6801+ module. This function is controlled by the **AFD Insert**, **VI Insert**, and **WSS Insert** parameters located in the **Video > Processing > ARC > AFD-VI-WSS Insertion** path. Table 3-3 lists the function of each of the available options (some options are not available in all conversion modes).

You can also remove WSS from the input video stream. To do this, follow: **Video > Input > De-embedder > Input WSS Remove**

Table 3-3. AFD, VI and WSS Code Insertion

Option	Details
Pass	The incoming AFD, VI or WSS code is inserted unmodified. (This option is only supported in SD-ARC and crossconversion modes. In up- or downconversion modes, the **Pass** option is equivalent to a loss of code, even when an input code is present. When a loss of code occurs, the module will insert your selection from the **AFD Pass on Loss**, **VI Pass on Loss**, or **WSS Pass on Loss** parameters.)
Remove	No code is generated by the module. The original input code is removed, except for the following: • WSS in line 23 • All codes in proc bypass mode.
Auto	The module generates code automatically and inserts it. The code can be generated in one of the following scenarios: • A standard or custom aspect ratio is selected, and the corresponding AFD, VI, or WSS code is inserted. • The **ARC Control** parameter is set to **AFD, AFD-ALTR, VI, VI-ALTR, WSS**, or **WSS-ALTR**, and the generated output code is based on input code according to the alternate implementations of the standard. • The **ARC Control** parameter is set to **AFD-Custom Map, VI-Custom Map** or **WSS - Custom Map**, and the output code is generated from the custom map settings.
• Custom AFD Map • Custom VI Map • Custom WSS Map	The output code is generated according to the custom map table.
(code list)	The actual code selected is inserted

AFD, VI, WSS Based Aspect Ratio Control

When you set the **ARC Control** parameter to follow the aspect ratio codes (**AFD, AFD-ALTR, AFD-Custom Map, VI, VI-ALTR, VI-Custom Map, WSS, WSS-ALTR,** and **WSS-Custom Map**), the aspect ratio control is based on input AFD, VI, or WSS code. **AFD-Custom Map, VI-Custom Map,** and **WSS-Custom Map** make it possible for you to perform automatic aspect ratio conversions based on the custom defined mapping table. The other options set the ARC to an existing standard. When the input code is missing, the ARC behavior is defined by **Loss of AFD ARC**, **Loss of VI ARC** or **Loss of WSS ARC.** Only one of these options can be enabled at any one time.

Though they are not widely used, some AFD, VI or WSS codes recommend cropping part of the image. When this type of cropping is enabled, the module will take longer to change ARC modes. To create faster ARC transitions, you can disable the cropping using the **AFD Crop Enable** parameter (**Video > Processing > ARC > ARC Control**).

When the ARC is based on AFD, VI, or WSS, and the output standard is SD-SDI, you must set the output aspect ratio (either 4:3 or 16:9) to ensure that the correct mapping table is used. (Follow **Video > Processing > ARC > ARC Control > SD Out Aspect Ratio**.)

AFD, VI, WSS Custom Mapping Configuration

Using the controls in **Video > Processing > ARC > AFD-VI-WSS Custom Map**, you can define a special mapping table other than the one specified by a standard. Given any input AFD, VI or WSS code, you can define the aspect ratio behavior and output AFD, VI and WSS code independently.

Advanced Controls

The de-embedding line controls for VI and WSS are at **Video > Input > De-embedder**. The embedding line number controls for AFD, VI, and WSS are at **Video > Output > Embedder**.

If you are using VI according to the SMPTE Proposed RP-186+ standard as of January 11, 2007, you must ensure you have enabled the standard by following this path: **Video > Output > Embedder > SD Out VI with AFD** (default setting is **Yes**).

At this time, Bar Data and Pan-Scan for VI and AFD are not supported.

AFD Descriptions

In the following pages, Figures 3-7 to 3-12 show the different AFD code descriptions. Comparable WSS and VI templates are included in the SD-SDI descriptions.

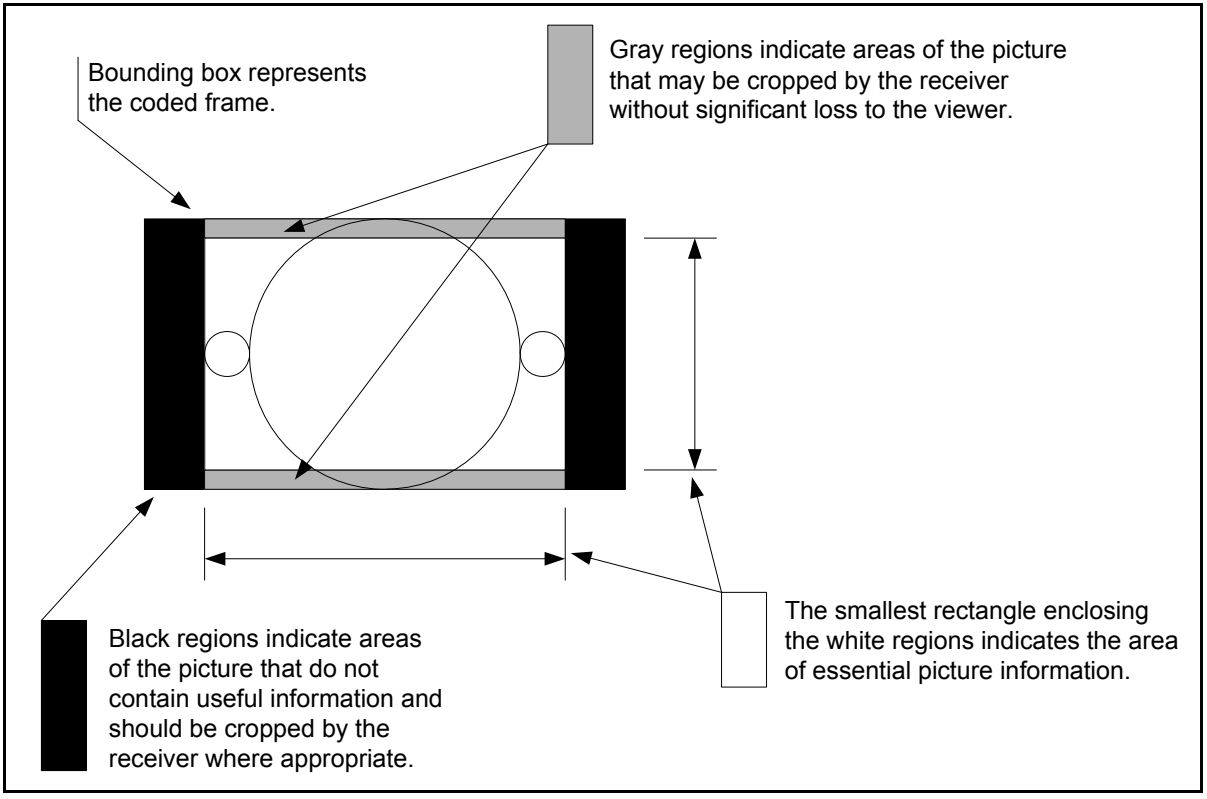


Figure 3-6. Explanation of AFD Diagrams

AFD 4:3 code and description

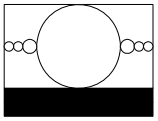
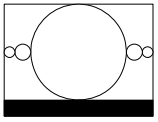
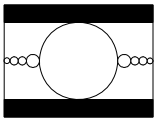
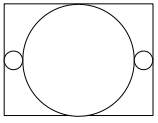
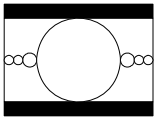
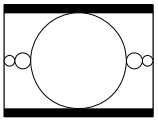
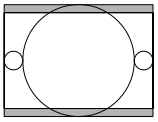
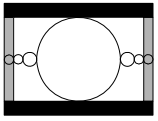
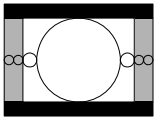
WSS name	AFD and VI Select parameter options	Illustration in a 4:3 coded frame	Description
100 16:9 Top	(4:3) 0010 16:9 Top		Image with a 16:9 aspect ratio as letterbox at the top of a 4:3 coded frame
010 14:9 Top	(4:3) 0011 14:9 Top		Image with a 14:9 aspect ratio as letterbox at the top of a 4:3 coded frame
101 GT 16:9	(4:3) 0100 GT 16:9		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 4:3 coded frame
000 4:3 Full	(4:3) 1000 4:3 Full		Image is full frame, with an aspect ratio that is the same as the 4:3 coded frame
011 16:9 CNTR	(4:3) 1010 16:9 L		Image with a 16:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
001 14:9 CNTR	(4:3) 1011 14:9 L		Image with 14:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
110 4:3 A 14:9	(4:3) 1101 4:3 A 14:9		Image with a 4:3 aspect ratio and with an alternative 14:9 center in a 4:3 coded frame
Not applicable	(4:3) 1110 16:9 LA 14:9		Image with a 16:9 aspect ratio and with an alternative 14:9 center as a vertically centered letterbox in a 4:3 coded frame
Not applicable	(4:3) 1111 16:9 LA 4:3		Image with a 16:9 aspect ratio and with an alternative 4:3 center as a vertically centered letterbox in a 4:3 coded frame

Figure 3-7. Available AFD Select Options when OutAspectRatio is Set to 4:3

AFD 16:9 code and description

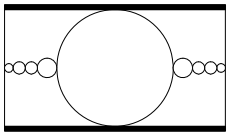
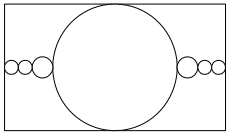
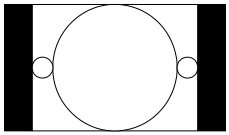
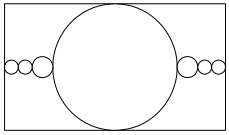
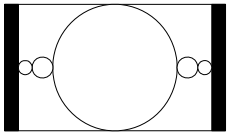
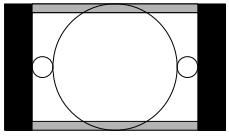
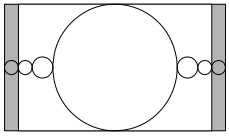
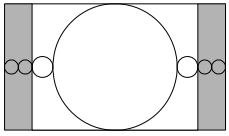
WSS name	AFD and VI Select parameter options	Illustration in a 16:9 coded frame	Description
Not applicable	(16:9) 0100 GT 16:9		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 16:9 coded frame
111 Anamorphic	(16:9) 1000 16:9 Full		Image is full frame, with an aspect ratio that is the same as the 16:9 coded frame
Not applicable	(16:9) 1001 4:3 P		Image with a 4:3 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
Not applicable	(16:9) 1010 16:9 Prtctd		Image is full frame, with a 16:9 aspect ratio and with all image areas protected
Not applicable	(16:9) 1011 14:9 P		Image with a 14:9 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
Not applicable	(16:9) 1101 4:3 P A 14:9		Image with a 4:3 aspect ratio and with an alternative 14:9 center as a horizontally centered pillarbox image in a 16:9 coded frame
Not applicable	(16:9) 1110 16:9 A 14:9		Image with a 16:9 aspect ratio and with an alternative 14:9 center in a 16:9 coded frame
Not applicable	(16:9) 1111 16:9 A 4:3		Image with a 16:9 aspect ratio and with an alternative 4:3 center in a 16:9 coded frame

Figure 3-8. Available AFD Select Options when OutAspectRatio is Set to 16:9

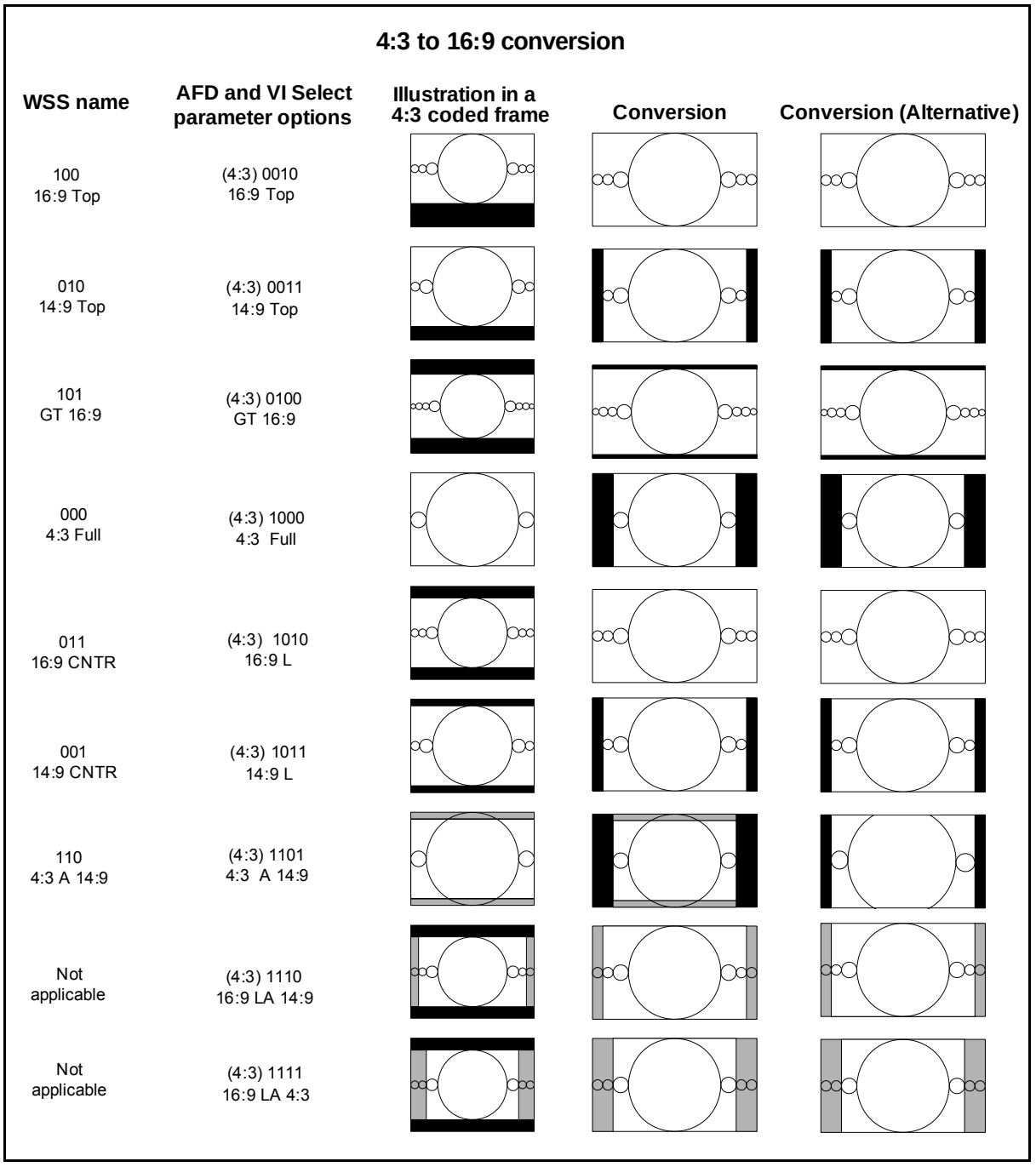


Figure 3-9. Available AFD Select, VI Select, and WSS Select Options When Converting from 4:3 to 16:9

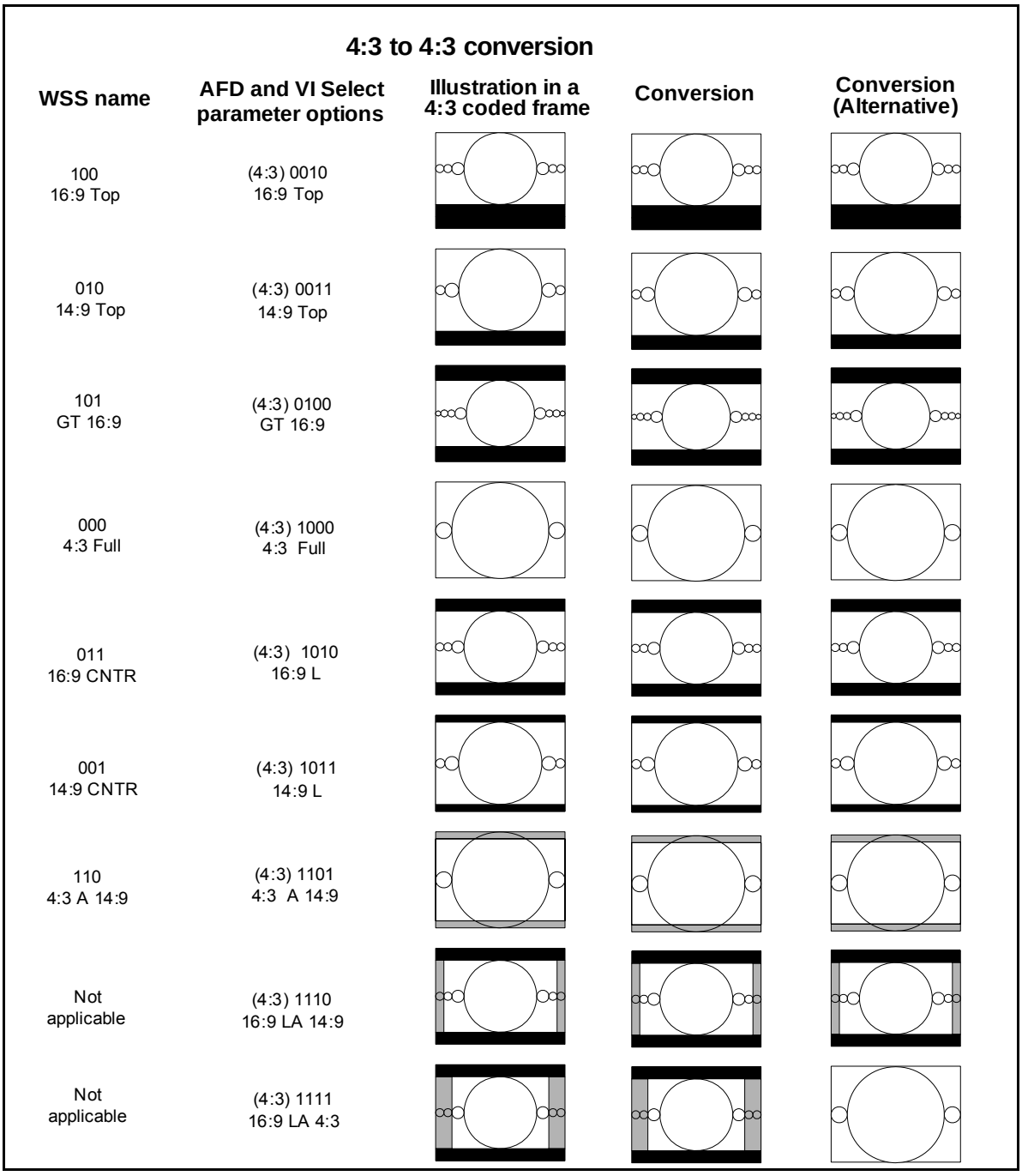


Figure 3-10. Available AFD Select, VI Select, and WSS Select Options When Converting from 4:3 to 4:3

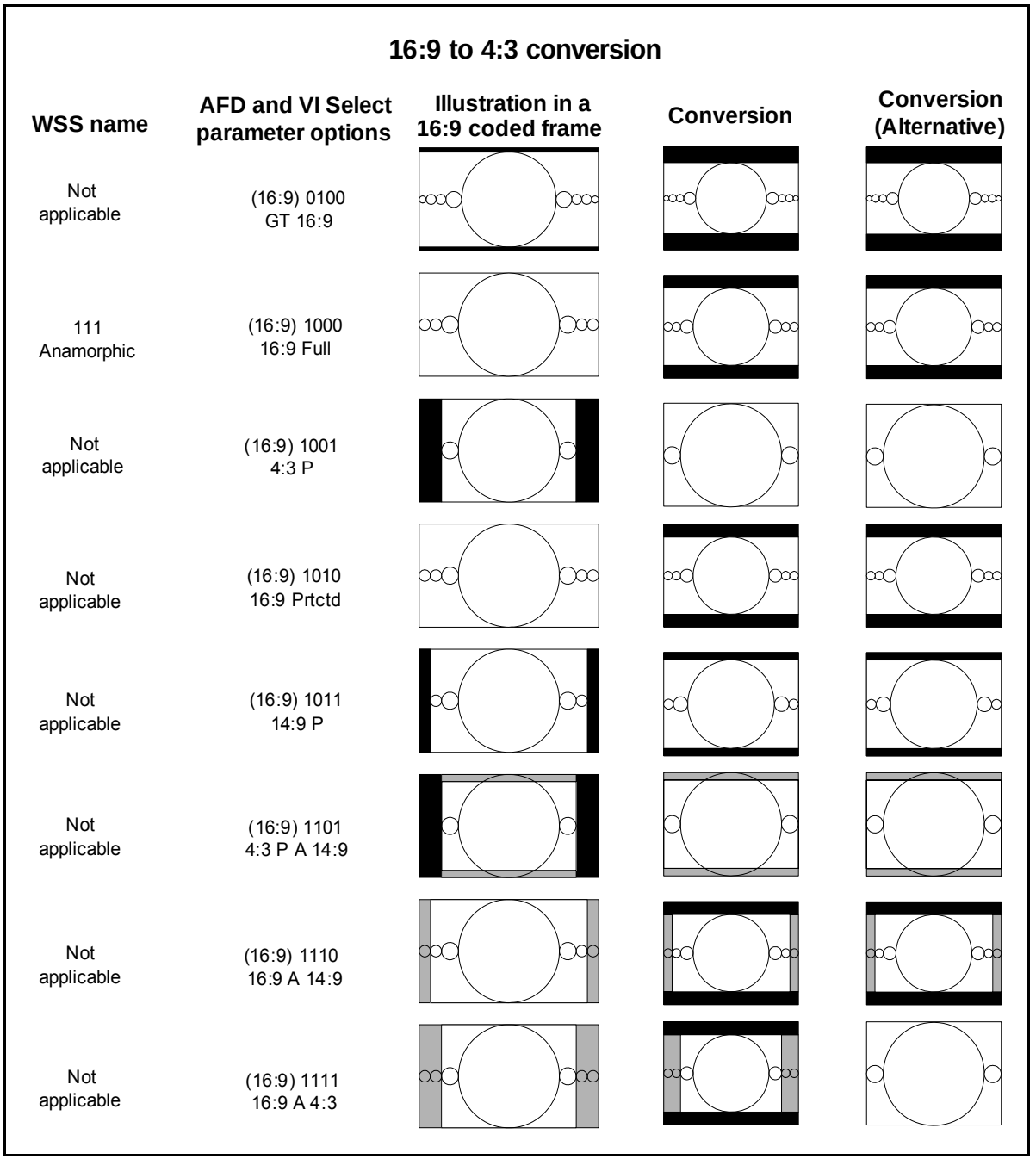


Figure 3-11. Available AFD Select, VI Select, and WSS Select Options When Converting from 16:9 to 4:3

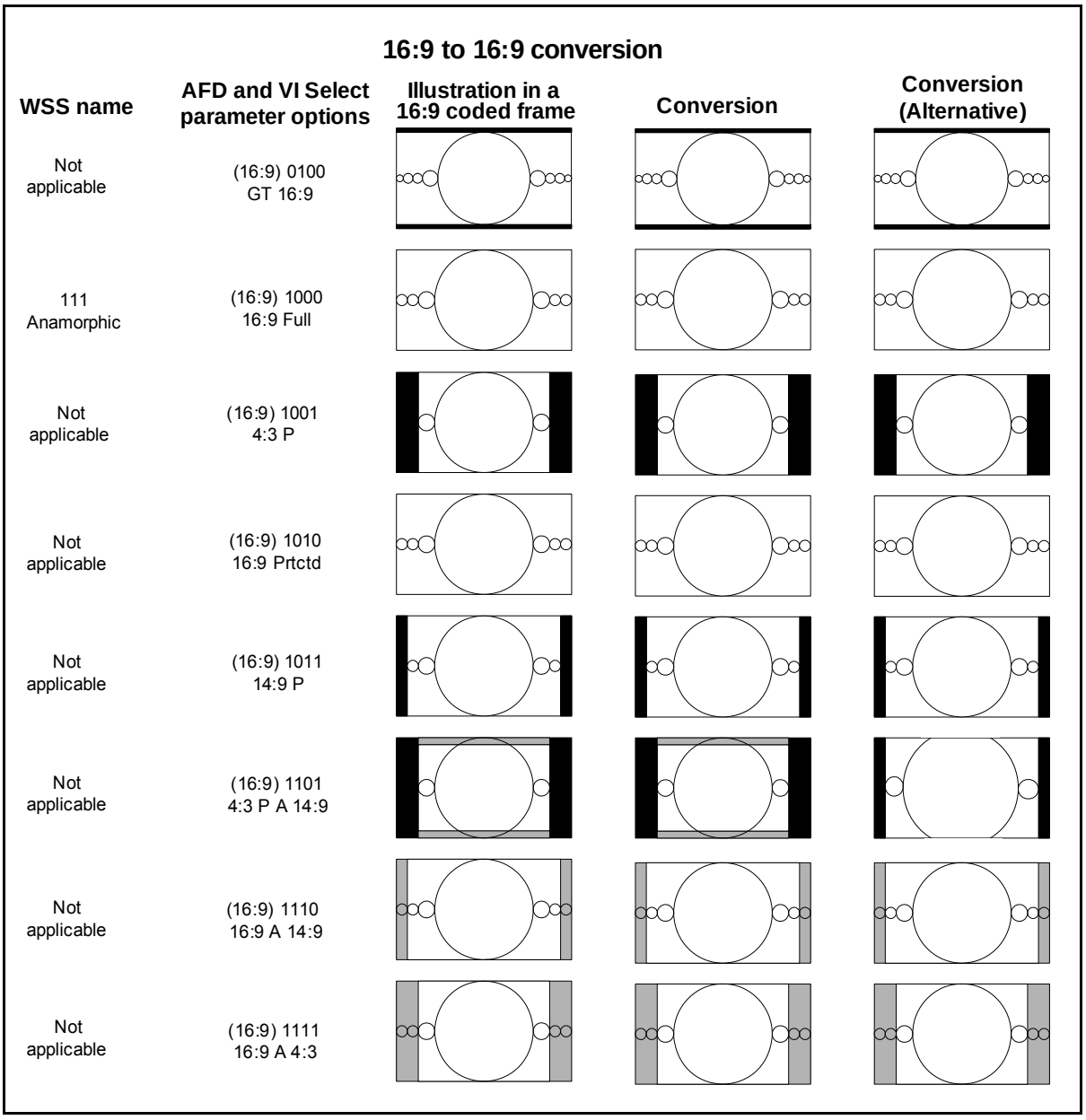


Figure 3-12. Available AFD Select, VI Select, and WSS Select Options from 16:9 to 16:9

Closed Captioning and DVB Teletext Captioning

Although North America has dedicated standards for closed captioning of video (EIA-608 and 708), many countries in Europe and elsewhere have not yet adopted formal standards. For these countries, closed captioning is part of the DVB Teletext System as described in ITU-R BT-653-3. These specifications define all Teletext Systems (Systems A, B, C, D) used in the world and are also known as the World System Teletext (WST). A Teletext system is made of several pages of various data information and CC data is described in one these pages. System B is used in Australia, the UK, and Germany, among other countries.

Australian closed captions are inserted on line 21/334 in analog PAL broadcast signals, as per the ITU-R BT-653-3. When analog PAL is produced or converted to SDTV (625 digital), a digitized version of the closed captioning appears on line 21/334 (in the same way line 21 on NTSC signals is digitized and appears on the line 21 of SD-SDI signals). The ITU-R BT-653-3 document proposed by Free TV Australia indicates how to carry this CC data into the VANC area of SD-and HD-SDI signals by use of the SMPTE 334M VANC embedding protocol. For digital broadcasting, Australia intends to use the ETSI EN 300 472 standard that specifies the conveyance of ITU-R System B Teletext in DVB bit streams.

Setting Closed Captioning and Teletext

To make changes to the default CC and Teletext settings, use the **Closed Captioning/Teletext Embed** and **Closed Captioning/Teletext Embed Line** parameters from the path **Video** > **Output** > **Embedder** path.

To verify the presence of the embedded CC, use the **Input Closed Captioning/Teletext Present** parameter (**Video** > **Input** > **De-embedder** path).

If you have purchased and enabled the XHD6801+ closed captioning feature, you can use the closed captioning parameters to enable and select the video line in which you want to embed closed captioning data. Contact your product sales representative for information about obtaining a closed captioning license key. If you have already purchased a license key, but have not yet enabled the feature, see “Entering License Keys” on page 36.

Audio Configuration

XHD6801+ modules process embedded audio. The input embedded audio from SDI 1 is demultiplexed (de-embedded) and synchronized to the video, delayed to match the video processing delay, processed, and then remultiplexed (re-embedded) into HD- and SD-SDI video output. Up to four groups of audio can be embedded into the video stream.

Audio Controls

XHD6801+ modules can route audio from one of several sources to the outgoing SDI signal (up to 8 channel pairs can be embedded).

The modules are capable of demultiplexing up to four groups of embedded audio from the primary video SDI stream, and embedding up to four groups into the output SDI stream. XHD6801+ modules can select up to eight channel pairs of embedded audio.

The **Demux Group Present** and **Demux Channel Pairs Present** parameters (**Audio** > **Input** > **Status** > **Demux Group Present** and **Demux Channel Pairs Present**) indicate which groups and channel pairs have audio present in the video inputs.

See page 55 for more information about audio status parameters.

Audio Routing

Input

To manually configure the audio inputs, you will need to select options in the **Audio** > **Input** > **Routing** section. Set your options in the **SRC1** to **SRC8 Input Select** parameters.

The default settings for the inputs follow this pattern:

- SRC1 Input Select = SDI 1 Group 1 Channel 1/2
- SRC2 Input Select = SDI 1 Group 1 Channel 3/4
- SRC3 Input Select = SDI 1 Group 2 Channel 1/2
- SRC4 Input Select = SDI 1 Group 2 Channel 3/4, etc.

Output

To manually configure the output of the audio, select **Enable** in **Mux Group 1 Enable** to **Mux Group 4 Enable.** (This is found at **Audio > Output > Embedder > Mux Group 1 Enable** to **Mux Group 4 Enable.**)

Then set your options in the **Routing** section **(Audio > Output > Routing > Mux Group *x* Channel *x*)**.

The default audio routing settings follow this pattern:

- Mux Group 1 Channel 1 = SRC 1A
- Mux Group 1 Channel 2 = SRC 1B
- Mux Group 2 Channel 1 = SRC 2A
- Mux Group 2 Channel 2 = SRC 2B, etc.

In addition to selecting audio sources from the video groups, four custom tone generators are available, as well as **Mute** and **SMPTE RP155** and **EBU R68** tones. To set the four custom tones, follow the path to **Audio > Other > Tones > Tone Generators 1** to **4 Level**.

Audio Proc Amp

Gain, bypass, and delay controls are available for the left and right side of each of the processed audio channels. You can individually adjust the gain and delay of the left and right sides of each channel using the control parameters in the **Gain** and **Delay** sections (**Audio > Processing > Gain** or **Delay**).

The audio can contain non-PCM audio data. In this case, the sample rate converter must be bypassed to ensure audio integrity. You must individually indicate which sample rate converter or gain to bypass using the **SRCx Gain/Bypass** parameters (**Audio > Input > Bypass > SRC*x* Gain/Bypass**). Select **Manual** in the **SRC/Gain Bypass Mode** to enable these individual controls.

If you set **SRC/Gain Bypass Mode** to **Auto**, the audio will be monitored, and if non-PCM audio data is detected, the sample rate converter for that side of the channel will be bypassed.

In addition to the mute controls that control audio pairs individually, a **Master Mute** control mutes all of the audio channel pairs (**Audio > Processing > Gain > Master Mute**). Also, if the audio source for either side of a given audio channel does not have any incoming audio, the signal will be automatically muted.

Audio Status Parameters

The read-only **Demux Group Present** parameter (in the **Audio > Input > Status** path) indicates which groups are present in the video input (see Figure 3-13). The "=" indicates no audio is detected for a particular group, while the letter **P** indicates the presence of audio. For example, "= P= =" means the XHD6801+ detects audio in Group 2, but no audio is detected in the other three groups.

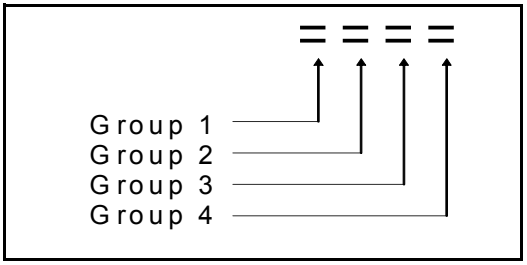


Figure 3-13. Demux Group Present and Demux Group Error

The **Demux Group Error** parameter (also in the **Audio > Input > Status** path) displays errors in the same way. In a string of "=" signs, the letter **E** indicates an error for that audio group.

Demux Channel Pair Present displays the eight channel pairs, with the letter **P** indicating audio presence (see Figure 3-14).

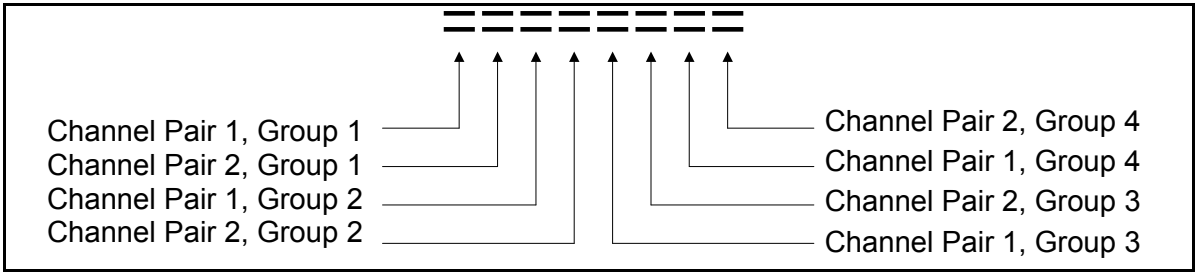

Channel Pair 1, Group 1
Channel Pair 2, Group 1
Channel Pair 1, Group 2
Channel Pair 2, Group 2
Channel Pair 2, Group 4
Channel Pair 1, Group 4
Channel Pair 2, Group 3
Channel Pair 1, Group 3

Figure 3-14. Demux Channel Pair Present/Type

Demux Channel Pair Type displays the eight channel pairs, with the letter **A** indicating PCM audio, and the letter **D** indicating non-PCM (data).

GPI

The XHD6801+ module provides four GPI inputs and two GPI outputs for automation. These are open collector style inputs with approximately 10 KΩ pull-ups to +5V. This means that you can use *contact closure-to-ground* switches to control these GPI inputs.

GPI Input

The GPI input actions are controlled by parameters in **Video > Other > GPI Input**.

GPI inputs make it possible to control the ARC being used for a particular conversion mode, as well as the AFD, WSS or VI code to be inserted. The read-only **GPI Input Status** parameter provides current information. All GPI events occur in the order they are triggered and will override older events.

GPI Output

The GPI output actions are controlled in the **Video > Other > GPI Output** path.

GPI outputs can reflect the state of the current ARC being used, or can be triggered on a specific input AFD, WSS or VI code.

The current GPI output active status can be read from the **GPO Output Status** parameter.

Video Keying

The video keying feature is activated by following the **Video > Output > Config > Video Keying** path. When enabled, the key image appears on the **SDI Program/Monitor Out** feed. The **On Screen Display** feature (**Video > Output > Config > On Screen Display)** also appears on the **SDI Program/Monitor Out** feed when it is enabled.

Chapter 4

Parameters, LEDs, and Alarms

Overview

This chapter describes the parameters, LEDs and alarms used on the XHD6801+.

The following topics are covered:

- “Control Parameters” on page 58
- “LEDs and Alarms” on page 59

Control Parameters

For a complete list of the XHD6801+ parameters, see the separate *XHD6801+ Parameter List and the XHD6801+ On Screen parameter List* that accompany this manual.

The parameters are listed in the order that they appear in CCS Pilot and Navigator. If you are using + Pilot Lite, some parameters in the list may not appear in the order as they appear in the software. Also, because of space limitations, some rarely-used parameters will not appear in the OSD list.

On Screen Display Monitoring

If you are using card-edge controls to configure your XHD6801+ module, you can use the OSD Monitoring feature to view the current parameter selections. When the **On-Screen Display** parameter is turned on, the current parameter selections are displayed on module's monitoring outputs. For information on enabling OSD Monitoring, see "Enabling On-Screen Display" on page 35.

To view the list of card-edge parameters, see the *XHD6801+ On-Screen Display Parameters* document, available on the 6800+ CD-ROM.

LEDs and Alarms

LEDs

The module LEDs are located on the card edge of the front module (see Figure 4-1). Table 4-1 on page 60 describes the meanings of the LEDs and their colors.

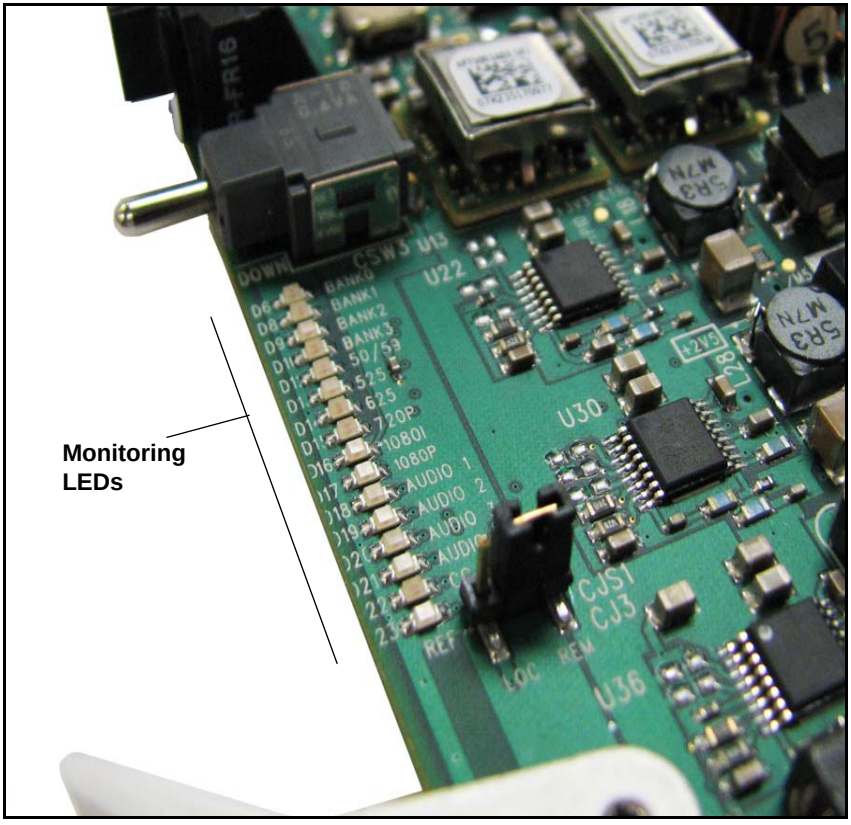


Figure 4-1. Location of XHD6801+ LEDs

Table 4-1. Status and Monitoring LEDs

LED	Description	Color Indication
Status	There is no power to the module; the module is not operational.	None (off)
	The module is receiving power and is operating properly.	Green
	The module detects an alarm condition or the module's initialization has failed.	Solid Red
	The module has detected a significant hardware/ firmware fault; contact your Customer Service representative.	Flashing Red
	The module is undergoing configuration.	Amber
50-59	Indicates the frame rate for the input video standard	• Green: 59 • Off: 50
525	Indicates the input standard is 525	Green: 525 input standard is detected
625	Indicates the input standard is 625	Green: 625 input standard is detected
720p	Indicates the input standard is 720p	Green: 720p input standard is detected
1080i	Indicates the input standard is 1080i	Green: 1080i input standard is detected
1080p	Indicates the input standard is 1080p	Green: 1080p input standard is detected
Audio1	Reports the presence of audio group 1 in the input video stream	Green: Group 1 audio is present
Audio2	Reports the presence of audio group 2 in the input video stream	Green: Group 2 audio is present
Audio3	Reports the presence of audio group 3 in the input video stream	Green: Group 3 audio is present
Audio4	Reports the presence of audio group 4 in the input video stream	Green: Group 4 audio is present
CC	Indicates the presence of closed captioning	Green: Closed captioning data is present
Reference	Indicates the presence of a valid reference signal	Green: Valid signal is present

Alarms

The XHD6801+ modules do not have any card-edge alarms. Instead, the module **Status** LED on the corner of the module lights up red if an error is detected. See Figure 1-1 on page 6 for the location of this LED.

Table 4-2 describes the specific alarms for XHD6801+ modules. You can only identify specific alarms using a software control application.

Table 4-2. XHD6801+ Alarms

Alarm Name	Alarm Meaning	Alarm Level
SDI 1 Std Mismatch	There is a mismatch between reference video and video standard	Major
SDI 1 Loss of Video	The module detects a loss of video at the SDI 1 input	Major
Processing Bypass Active	The Scalar Bypass switch (Video > Output > Scalar Bypass) is turned on.	Minor
Reference Not Locked	Loss of locked reference	Major
Teletext Parity Error	The teletext input has a parity error	Minor
Teletext Frame Error	The teletext input has a frame error.	Minor
Master Mute On	The master audio mute is enabled.	Minor
PCM Vbit Mute On	The PCM outputs are automatically muted when the V-bit is set.	Minor
Loss of AFD	The incoming AFD signal is disrupted.	Major

Chapter 5

Specifications

Overview

The following specification tables appear in this chapter:

- “SD/HD-SDI Video” on page 64
- “Genlock” on page 65
- “SDI Video Outputs” on page 66
- “Audio Delay (Data Out)” on page 67
- “Performance” on page 67

Specifications and designs are subject to change without notice.

Inputs

SD/HD-SDI Video

Table 5-1. SD/HD-SDI Video Input Specifications

Item	HD-SDI Specification	SD-SDI Specification
Number of inputs	1	
Standards	SMPTE 292M (1.485, 1,485/1.001 Gbps)	SMPTE 259M-C 270 Mbps, 525/625 component video
Frame rate	• 1080i: 50, 59.94 Hz • 720p: 50, 59.94 Hz • 1080p: 23.98, 29.97, 25 Hz	• 486i: 59.94 Hz • 576i: 50 Hz
Connector	BNC per IEC 169-8	BNC per IEC 169-8
Impedance	75Ω	75Ω
Return loss	>15 dB (typical) from 5 MHz to 1485 MHz	>15 dB (typical) from 5 MHz to 270 MHz
Equalization	Adaptive cable equalization for up to 328 ft (100 m) (typical) of Belden 1694A coaxial cable at 1.485 Gbps	Adaptive cable equalization for up to 700 ft (230 m) (typical) of Belden 8281 co-axial cable

Genlock

Table 5-2. Genlock Input Specifications

Item	Specification
Connector	BNC per IEC 169-8
Impedance	75Ω
Return loss	> 40 dB 25 Hz to 30 MHz (SMPTE 318M-1999)
Common mode range	• 5.5 V pk-to-pk
Input level	• NTSC/PAL-B (1 V pk-to-pk, -4.5 dB to 6.0 dB) • ± 300 mV, -4.5 dB to 6.0 dB for Tri-Level Sync •1080i: 59.94/50 •1080p: 29.97/25
Locking range	± 6 ppm (sync lock only, no burst lock)
Signal type	• NTSC/PAL-B analog composite • ± 300 mV Tri-Level Sync
Standard	SMPTE 170M (NTSC), ITU-R BT.470-6 (PAL-B), SMPTE 274M (1080i, 1080p)

Outputs

SDI Video Outputs

Table 5-3. SD/HD-SDI Reclocked Output Specifications

Item	HD-SDI Specification	SD-SDI Specification
Number of outputs	8	
Standards	SMPTE 292M (1.485, 1.485/1.001 Gbps)	SMPTE 259M-C (270 Mbps, 525/625 component video)
Connector	BNC per IEC 169-8	BNC per IEC 169-8
Impedance	75Ω	75Ω
Return loss	>15 dB (typical) from 5 MHz to 1485 MHz	>15 dB (typical) from 5 MHz to 270 MHz
DC offset	0.0 V ± 0.5 V	0.0 V ± 0.5 V
Signal level	800 mV ± 10%	800 mV ± 10%
Rise and fall time	<270 ps (20% to 80%)	400 to 1500 ps (20% to 80%)
Overshoot	<10% of amplitude (all outputs terminated)	<10% of amplitude (all outputs terminated)
Jitter	• Timing <1 UI pk-to-pk • Alignment <0.2 UI pk-to-pk	<0.2 UI pk-to-pk

Miscellaneous

Audio Delay (Data Out)

Table 5-4. Audio Delay Specifications

Item	Specification
Number of outputs	1
Connector	BNC per IEC 169-8
Impedance	75Ω
Return loss	>20 dB (typical) to 6 MHz

Performance

Table 5-5. Performance Specifications

Item	Specification
Power consumption	17.5 W
Operating temperature	41° to 113°F (5° to 45°C)

Propagation Delays

Table 5-6. Minimum Propagation Delays (59Hz)

Input	Output (ms)				
	525	720p59	1080i59	1080p29	1080p23
525	33.4	33.4	33.4	50.1	33.4
720p59	16.7	16.7	16.7	16.7	16.7
1080i59	33.4	33.4	33.4	33.4	33.4
1080p29	33.4	33.4	33.4	33.4	33.4
1080p23	41.7	41.7	41.7	41.7	41.7

Table 5-7. Minimum Propagation Delays (50Hz)

Input	Output (ms)			
	625	**720p50**	**1080i50**	**1080p25**
625	40	40	40	60
720p50	20	20	20	20
1080i50	40	40	40	40
1080p25	40	40	40	40

Appendix A

Communication and Control Troubleshooting Tips

Overview

Find the following troubleshooting information in this appendix:

- “Software Communication Problems” on page 70
- “Hardware Communication Problems” on page 73

Software Communication Problems

The frame is powered up, but the module does not communicate with + Pilot Lite or CCS Pilot/Navigator.

Solutions

- Ensure you have specified the proper module slot.

  See your *Frame Installation and Operation Manual* for more information about slot identification.

- Verify whether you need an ICE6800+ or 6800+ETH module installed in the frame (not required for FR6822+).
  - FR6802+ frames only use ICE6800+ modules to communicate with CCS software and hardware.
  - FR6802+QXF frames use ICE6800+ or 6800+ETH modules to communicate with CCS software and hardware.
- Remove any legacy 6800 series product that is in the frame.

  + Pilot Lite and CCS software cannot communicate with legacy 6800 series products, even though these modules may operate with card-edge controls in an FR6802+ frame. Legacy 6800 products do not have the "+" symbol on their extractor handles.
- Check for bent pins on the back module by following this procedure:
  a. Unplug the front module.
  b. Unscrew and remove the back module.
  c. Inspect the 20- or 30-pin spring connector at the bottom of the back module (Figure A-1 on page 71), and verify that the connector does not have any slightly bent or pressed pins.
  d. Carefully reposition any bent pins; if this is not possible, contact Customer Support.

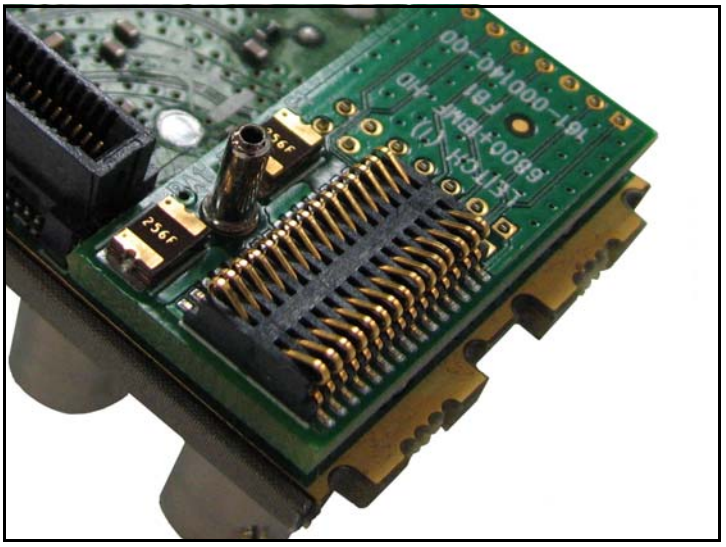


Figure A-1. Typical Back Module Spring Connector

The frame is powered up, but + Pilot Lite does not communicate with the module.

Solutions

- Ensure you have installed the correct cables between the PC and the frame:
  - A *null modem* serial cable must be used between a PC and an FR6802+ frame (not a straight-through cable). At minimum, this requires that pins **2** and **3** are crossed, but pin **5** (ground) is straight-through to pin **5**.
  - A USB cable must be used between a PC and an FR6802+QXF frame.
- Verify whether you need an ICE6800+ or 6800+ETH module installed in the frame.
  - + Pilot Lite control is disabled if an ICE6800+ or 6800+ETH control module is installed in the frame.
- Set the **Frame ID** DIP switch settings correctly (the **Frame ID** DIP switch is located at the rear of the frame.)
  - If only one frame is connected, set the DIP switch to **00**.
  - If multiple frames are used in a daisy-chain, set the DIP switch numbers consecutively to the following:

- **00** (frame 1)
- **01** (frame 2)
- **10** (frame 3
- **11** (frame 4)

See your *FR6802+ Frame Installation and Operation Manual* for more information about frame ID switch settings.

- Check that the correct COM port is configured in + Pilot Lite and that another application is not using that COM port.

+ Pilot Lite and CCS software see the frame, but do not find all of the modules

Solutions

- Remove any legacy 6800 series products.
- Plug your modules in before starting the discovery.
- Start your discovery after the frame and all modules have fully powered up.
- Refresh + Pilot Lite (**File** > **Refresh**), and ensure that the installed modules are fully powered up first before discovery.

+ Pilot Lite and CCS Pilot/Navigator do not respond after they have been launched.

Solution

Close either + Pilot Lite or CCS Pilot/Navigator. Both programs cannot be running at the same time on the same PC.

+ Pilot Lite and CCS software show a module in the control window, but cannot control it.

Solution

1. Set the module's Local/Remote jumper to **Remote.**
2. Ensure the module name in the Control window matches the module type in the frame.
3. Gently push the module into its slot in the frame to ensure it is seated properly and powered up.
4. Verify that the Control window indicates the device is ready.

Hardware Communication Problems

After a power failure, the frames and PC do not communicate.

Solution

1. Wait four minutes for the frames to recover from the power failure.
2. Close the + Pilot Lite or CCS software, and then restart the PC.
3. Restart the software application.

The module does not seem to work.

Solutions

- Ensure the correct frame is powered up.
- Verify that all appropriate rear connections are secure.
- Gently push the module into its slot in the frame to ensure it is seated properly.
- Ensure the back module does not have bent pins by following this procedure:
    a. Unplug the front module.
    b. Unscrew and remove the back module.
    c. Inspect the spring connector at the bottom of the back module (Figure A-1), and verify the connector does not have any slightly bent or pressed pins.
    d. Carefully reposition any bent pins; if this is not possible, contact Customer Support.

Index

A

Active Format Description (AFD) 40–51
AFD/ARC alignment 40
Alarms list 61
Applications for the module 5
Aspect Ratio Conversion (ARC) 37–51
Audio
- configuration 53–55
- controls 53
- embedding and demuxing 53–55
- gain, bypass, and delay 54
- muting 54
- proc amp 54
- routing 53
- status parameters 55

Australian TV closed captioning 52

B

Back module 8–9
Bank Select LEDs 34
Bypass control 43, 54

C

CC Embed parameter 52
CCS applications 32–33
- refreshing and discovering modules 32
- troubleshooting 70–73

Closed captioning 52
Copyright information ii
Correcting failed upgrades 21–23

D

Default parameter settings 35
Demux error parameters 55
Demux parameters 53, 55
Detection of AFD, VI, and WWS 42
Discovering a module 33
DVB Teletext captioning 52

E

Errors in demux 55
External reference termination jumper 15

F

Firmware upgrading 18–23
Frame power ratings 12
Frame sync and scaled outputs 28–29
Free TV Australia closed captioning 52
Front module 6

G

Gain, bypass, and delay for audio 54
Genlock specifications 65
GPI
- inputs and outputs 56
- pinouts 8

H

HD-SDI video input and output specifications 66

I

Input/output audio delay jumper 16
Installing and removing modules 17

J

Jumper settings 14–16

K

Keying feature 56

L

LEDs 6–7, 59–60
License keys 17, 36
Local/Remote jumper 14–15
Loss of video (LOV) mode 27–29

M

Main features 2
Manual information vii–viii
Module
- back 8–9
- front 6
- installation and removal 17
- status LEDs 60

Mux group parameters 54

N

Navigating the parameter list 58
Navigation Properties box 22

O

On-Screen display (OSD) 35, 58
Operating notes 26

P

Packing list 13
Parameter
- changes at card-edge 33–58
- settings 32–35

Parameters
- CC Embed 52
- demux error 55
- Demux Group and Channel Pairs 53
- Mux Group 54
- On-Screen Display 35
- SRC Input Select 53

Pilot Lite troubleshooting 70–73
Pinouts, GPI 8
Power ratings, frames 12
Precautions, safety xii
Proc amp, audio 54
Processing modes 27–29
Product servicing ix

Q

Q-SEE compliant thumbnails 30

R

Recalling default parameter settings 35
Reference termination jumper 15
Refreshing a module with Pilot Lite 32
Removing and installing modules 17
Returning a product ix
Revision history of the manual vii
RoHS compliance x

S

Safety precautions xii
Sample rate converter 53–54
Scaled outputs with re-clocked inputs 27–28
SD/HD-SDI
- reclocked video output specifications 66
- video input specifications 64

Setting jumpers 14–16
Shipping and unpacking a product ix
Signal flow diagram 10

Software
    license keys 17, 36
    upgrading 18–23
    version number 35
Specifications 63–67
SRC Input Select parameters 53
Standards
    RoHS compliance x
    SMPTE 52
    WEEE compliance xi
Streaming 30
Support documents viii

T

Teletext system 52
Thumbnails 30
Tone generators 54
Troubleshooting 69–73

U

Unpacking and shipping a product ix
Unpacking the module 13
Upgrading module software 18–23

V

Video Index (VI) 40–51
Video keying 56
Video processing modes 27–29
Video streaming 30

W

Warranty information ii
WEEE compliance xi
Wide Screen Signaling (WSS) 40–51
World System Teletext 52
Writing conventions viii

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